48120

September 1990

MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE

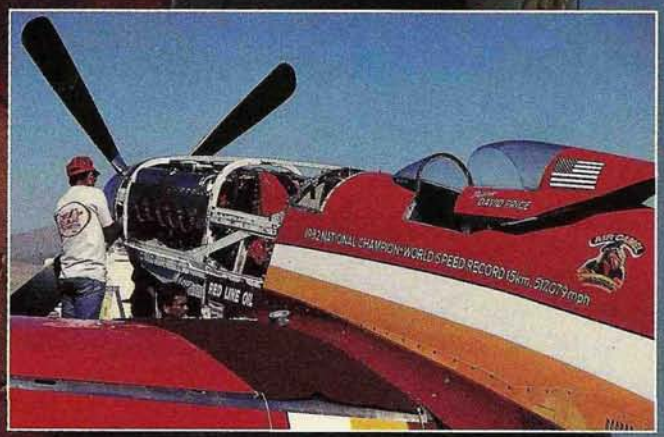
Canada $3.75

RACE SPECIAL!

Mini Reno Warbirds

RENO AIR RACES

Formula 1 Midgets



Build a $5 Wing Jig

EZ Dago Red

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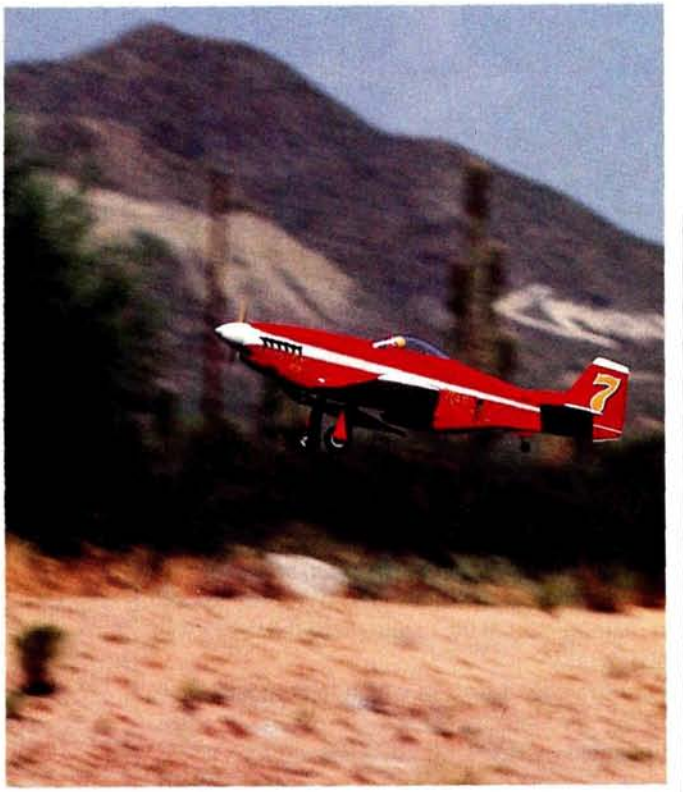
SEPTEMBER 1990 VOLUME 118, NUMBER 9

MODEL AIRPLANE NEWS



ON THE COVER: main photo—an impressive close-up of Jimmy Leeward's yellow P-51. Inset: top—a modeler takes a really good look at the real thing at the Reno Air Races; bottom—the full-size Dago Red; you can build your own with an ARF kit described in this issue—but it won't reach 517mph!

FEATURES

HELICOPTER SECTION

MINI CONSTRUCTION

COLUMNS

COLUMNS

DEPARTMENTS

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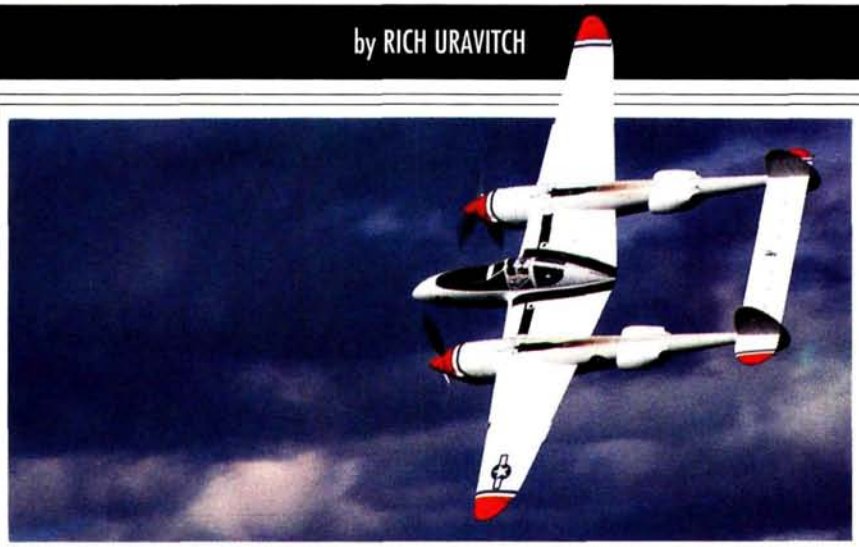
EDITORIAL

by RICH URAVITCH



As you may have already surmised, the theme of this issue is racing. Racing has always been an exciting form of competition—perhaps *the* most exciting, and it ranges from pitting animal against animal to human against human—either under their own steam, or with cars, boats and, yes, airplanes.

Everyone has raced at some time, and no matter how informal, racing means competition. The objective?—to win, to beat the other guy: beat him around the course; beat him to the last remaining seat in the theatre or to the last newspaper on the rack; challenge, race, win!

In R/C flying, there's a variety of racing classes in which to compete. Formula 1 is the ultimate, with Quicky 500 and 1/4 Midget close behind. I just learned of a racing event being planned by R/C Unlimited Racing Inc., and it promises to be one of the hottest R/C spectacles in a long time. Here's what I know so far: October '91 is the tentative date, and the location is likely to be out West. The event is called the "1st Annual R/C Unlimited Races and Air Show Competition."

The Unlimited racing category will recreate Reno racing in R/C form, with machines like Mustangs, Bearcats, Sea Furys, Corsairs, Yaks and Tsunamis competing head-to-head in heat races on a defined pylon course. These birds will have wingspans of at least 100 inches; they'll weigh a maximum of 55 pounds and use a piston engine of their builders' choice. As with the full-scale Unlimiteds, anything goes! There will be stringent safety requirements, and the competition is open to all AMA members.

The Airshow part of the event promises aerial routines performed by individual and multiple models, all aiming to dazzle the judges and the crowd. At stake for all this derring-do is over $25,000 in prizes—so far! I can't remember being this excited about a special R/C event since we became involved with the Top Gun scale competition. Complete details are available from R/C Unlimited Racing Inc., 565 Mercury La., Brea, CA 92621; phone (714) 255-0747. If you plan to get involved, let us know; some team efforts are already under way!

POINT TO PONDER

A recent OSHA report indicates that the average hair dryer produces over 115dB of sound. They're used nearly every day and close to your ears, and that makes concerns about our engines' noise pale by comparison, doesn't it? Don't you wonder how your non-modeling neighbors might react if you called the police because they were using a hair dryer? The "nuisance factor" of noise is more worthy of scrutiny than dB readings, don't you think? ■

MODEL AIRPLANE NEWS

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AIRWAVES

WHERE TO WRITE TO US: If you're writing to the editors (and we'd love to hear from you), please be sure to address your letters to "Airwaves" *Model Airplane News*, 251 Danbury Road, Wilton, CT 06897. Only subscription orders and inquiries are handled by our Customer Service Department in Mount Morris, IL; other mail addressed there must be forwarded to Connecticut, and this leads to long delays.

Reconstructing WW II?

I have a problem, and I thought you or your readers might be able to help. I'm having trouble finding plans for the Heinkel He-111; the Focke-Wulf FW-189 twin-engine recon plane (the Flying Eye); the Focke-Wulf TA-152H; the Fairey Firefly; and the Fairey Swordfish. The sizes aren't that important, although I'd prefer the medium ones (1/5, 1/8, 1/10, or 1/6 scale would be ideal).

I've been a modeler for 25 years, and for about 15 of those years, I've been driving my wife crazy with, "Guess what I want for my birthday?"—a Pica FW-190D9 for *only* $120! I get a kick out of the way she reacts to the "only" part! R/C is at the top of my hobby list, even though the prices are on the high side; but medium-size models aren't as brutal on my pocketbook. Your new format is very well-done. Keep up the good work!

LARRY G. HIX
Salinas, CA

Larry, you have a tall order there, and I hope you recognize that some of the subjects you're interested in, when modeled in 1/5 scale, will be well beyond what you might categorize as "medium" size. A 1/5-scale TA-152H will be a rather large, albeit impressive, airplane. Small-scale drawings, which you can scale-up to whichever size you'd like, are available from a variety of sources, e.g., Scale Model Research; Scale Plans and Photo Services; and our own Plans Directory.

You've been asking your wife for that $120 FW for 15 years, huh? If you'd asked her for $10 bucks a year over that time, you'd have had it three years ago! Incidentally, the Pica FW-190D9 is an ideal start for converting to the TA-152H.

RAU

NASA Safe-Wing Interest

I saw a picture of a floatplane in an article by Andy Lennon entitled, "NASA Safe Wing" (*MAN*, June '90). Could you please give me an address so I can write for a pattern or a kit? I've been reading your magazine for three years and buying it for over a year, and I build free-flight models. Thanks.

DUSTIN ROSENBERG
Brainerd, MN

Dustin, the design to which you refer is called the "Loon"—an amphibian that was built by Andy Lennon. There are no plans available, but I bet if enough interest is shown, we could convince Andy to prepare a construction article. Meanwhile, I've forwarded your request to him; perhaps he can help. RAU

Repent!—O Ye of Little Faith!

I'm sure you won't print this letter, since my comments about the AMA are uncomplimentary, but I have to try.

Until recently, I've felt that the American Model Association (AMA) was the champion of the American modeler, big and small. I'd like to share what my fellow modelers and I are currently experiencing.

I live in the high desert near Barstow, CA. Our flying field is a dry lake bed about 2 miles long and 1/2 mile wide with homes on either side. A company in this area contracts with the U.S. government to make R/C drones and surveillance planes. The problem is that the people at this company fly planes with Quadra 100,

(Continued on page 12)

BUILDING

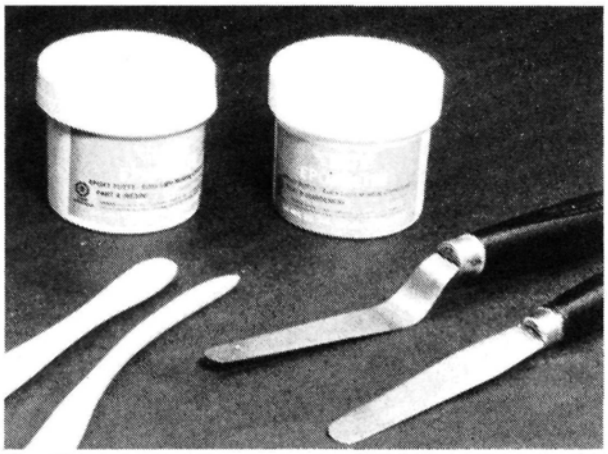
MODEL AIRPLANES

by JOE WAGNER

Fillets and ding repair: materials and techniques

NOTHING beats fillets for adding strength where a model airplane's fuselage and flying surfaces are joined. They improve performance and appearance, too. What would a scale Spitfire, Airacobra, or P-40 look like without fillets?!

Structurally, fillets provide extra "stress-transfer" area, so that sudden loads (e.g., from an unplanned landing) are distributed over a wide cross section, rather than being concentrated at a sharp change of contour. Fillets also allow air to flow more smoothly over the junctures of wings and fuselages. This not only reduces drag, but it also eliminates turbulent eddies in the airstream, which can interfere with the tail surfaces' functioning—especially at high angles of attack.



The different-colored components of Sig's Epoxolite simplify thorough mixing. (The wooden sculptors' tools shown is handy for fillet-making.)

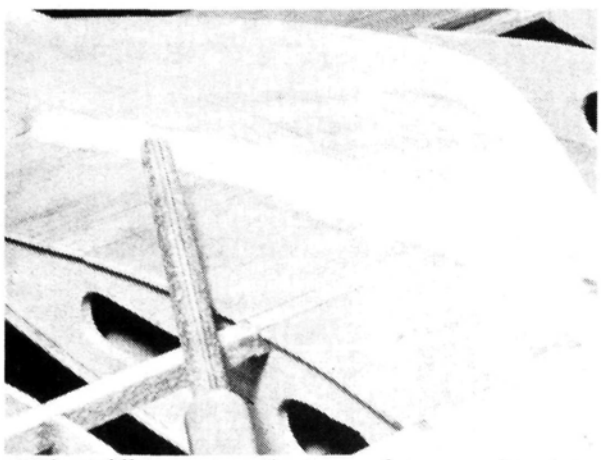
Fillets aren't used nearly as much as they could be, however, because they seem difficult to make, and if they're not done right, they add weight. It's easy to make strong, lightweight fillets, though. The trick is to use the *right materials,* and at least three good ones are available.

Epoxolite is sold by Sig*, and the company's catalogue explains how to use it. The recommended procedure can be improved, however. For example, Epoxolite becomes lighter and easier to finish-sand if microballoons are thoroughly mixed with the putty before it's applied. A half-and-half blend works well.

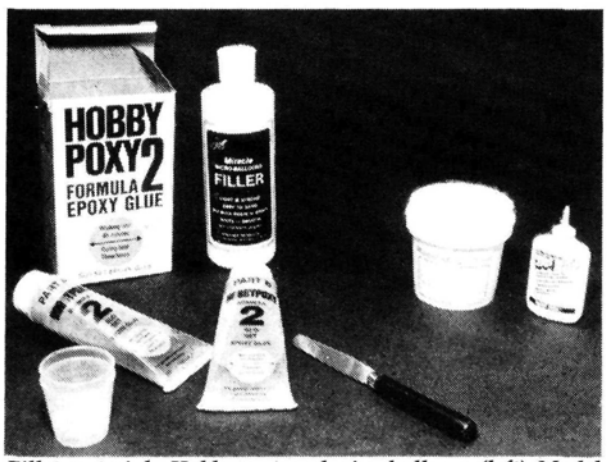
Sig advises you to shape the putty with water-wet fingertips. I do this—but only in the final stages. Earlier in the process, I wet my fingers with lacquer thinner instead. This prevents waterlogging the area around the fillet and ensures a strong bond between putty and wood. Don't overdo the lacquer thinner, as too much will weaken the putty, and *never* use lacquer thinner on Styrofoam!

Epoxolite takes much longer to cure than the instructions state, particularly in cool weather. I've found that a minimum of 48 hours is required when the temperature is approximately 70 degrees. (You can reduce this time slightly by heating the partly cured fillet with a hot-air gun.) If the fillet feels at all rubbery when you begin to sand, let it cure for one more day.

Round Permagrit sanders are excellent tools for shaping cured Epoxolite fillets. They resist clogging, and their half-coarse, half-fine abrasive surfaces are ideal for the job. They're available from Ace R/C* in three sizes



Without fillets, engine vibration and maneuvering stress would crack the wing-fuselage joint of this profile U-Control stunter in just a few flights! (Round Permagrit tools make fillet-shaping easy.)



Fillet materials: Hobbypoxy and microballoons (left), Model Magic and thin CA (right). Artists' palette knives make good mixers and applicators; so do popsicle sticks!

PROTECT YOUR LUNGS!

Jeff Cummins demonstrates the Uni-Mask. It's mighty inexpensive health insurance!

Breathing the sanding dust from almost any kind of putty can be hazardous. Silicosis, for example, can result from inhaling microballoon particles. That's why wearing a dust mask during model construction is a wise precaution. Many types and styles are available, but I prefer KHP's Uni-Mask, which is available from Ace R/C*. The Uni-Mask is inexpensive (six for about $2), light and thin (so it's not uncomfortable to wear or breathe through), yet extremely effective in stopping airborne dust and paint-spray particulates from entering your nose and mouth.

(3/4-, 1/2- and 1/4-inch diameter).

Even lighter and less expensive than Epoxolite is a mixture of Hobbypoxy* glue and microballoons. (I've been using Hobbypoxy Formula 2, but Formula III would probably work better. It's "thixotropic," which means that it won't flow out after shaping. Flow-out can be a problem with Formula 2.)

The trick to making fillet putty this way is to use as little glue as possible in the mixture. Epoxy is heavy and difficult to sand, so the higher the percentage of microballoons, the better. Be sure to stir the two ingredients thoroughly so that each microscopic balloon is well-coated with epoxy.

Goldberg's* Model Magic Filler is the third fillet material, and it's the lightest putty compound that I've tried—and the easiest to use! As good as Model Magic is, however, it isn't perfect. Despite its advertising claims, Model Magic does shrink slightly. For fillets with a 3/8-inch radius or less, the shrinkage is negligible, but heavier applications shrink enough to crack open as they dry. If you need to build up large fillets with Model Magic, do it in layers no thicker than 1/8 inch.

Model Magic is a water-thinned material, and even after it's thoroughly dry, water will dissolve it. This enables you to use every bit of material in the container; even when it appears to be all dried out, a few drops of water (and a lot of stirring) will restore its plasticity.

Water will also soften Model Magic on a model, however. Worse, the material is badly affected by any solvent that contains Xylol, Toluene, or the like, and this means that some finishing materials (e.g., airplane dope) will harm it. The damage is insidious; nothing appears on the finished surface, but when you try to sand it, you'll discover what has happened under the paint. Dope thinner makes Model Magic soft and crumbly (i.e., the consistency of Roquefort cheese), and the damage is permanent.

Fortunately, I've discovered a solution to this problem! After you final-shape and finish-sand a Model Magic fillet (or patch), apply thin CA in a wet coat over the entire area. Let it soak in as much as possible, then wipe off the excess. This makes the Model Magic nearly impervious to thinner; dope won't hurt it, and even exposure to water has no harmful effect.

OOPS!

Correction: In my last column, I talked about Coverite's Quick Stik, when I meant Balsarite; a packaging error caused the mistaken product identification. The adhesive used on the thin plywood was Coverite's new Film Formula Balsarite, not Quick Stik, which the company discontinued several years ago.

**Here are the addresses of the companies mentioned in this article:*

Sig Manufacturing Co., Inc., *401 South Front St., Montezuma, IA 50171.*

Ace R/C, Inc., *P.O. Box 511, Higginsville, MO 64037.*

Hobbypoxy Products *(a division of Pettit Paint Co, Inc.), 36 Pine St., Rockaway, NJ 07866.*

Carl Goldberg Models, Inc., *4734 West Chicago Ave., Chicago, IL 60651.* ■

AIRWAVES

(Continued from page 8)

2-cylinder-opposed, 10hp—or even larger—*unmuffled* engines. That, in itself, endangers our flying field, but an even greater problem is that they operate their radio transmitters pushing 30 watts of power on 72MHz, and they use 44 and 54, or whatever frequency they choose.

The modelers in this area have asked the company to stop (with that much power, they can cause modelers from Las Vegas to San Pedro to crash), but our requests fall on deaf ears. Several of us have lost planes that cost a lot of money and time. Please don't say the loss had other causes. We're all experienced modelers and fliers, and we know when our radios have been "hit."

We gathered about 25 signatures and wrote to the AMA district representative for help. We also talked to an FCC representative who said, "If you think your planes might crash, don't fly them." They weren't at all concerned that the company (under contract to the U.S. government) was breaking the law! The AMA wrote a very polite letter to the company saying they weren't a police agency, and they asked for the company's input so they could "provide information for the modelers in the Barstow area." The AMA rep suggested that we "build a 200-watt transmitter and shoot them down." He told me the AMA wouldn't do anything to help us.

Modelers should be aware that the $1,000,000 insurance that's used as a incentive to join AMA only pays if you crash on an AMA-sanctioned field, and if you're a member of an AMA-sanctioned club with your AMA numbers on your plane—and that's only after your homeowner's insurance did or didn't pay. Let's face it; a large percentage of its members will never even enter a contest, so what benefit will they receive?

The AMA isn't for the average modeler. It lobbies mostly for the manufacturers of models, engines and other model parts, and it helps the big-money contest pilots with financing. Unlike the National Rifle Association, which watches the laws and writes to its members whenever anything will jeopardize their hobby, modelers never hear from the AMA and, therefore, they have no idea what the AMA does with its money. The sad part is that modelers don't even realize that the AMA won't help them when they need it and that the insurance has all those restrictions. (I would have put the name of the company and the District AMA Rep in my letter, but my wife said you wouldn't print the letter if I did that. I doubt that you will anyway.)

REV. RICHARD A. KRAUSE

OK, Rev. Krause, both you and your wife were wrong. I'm printing your letter, not because of the challenge you've raised, but because other modelers may have had the same experiences. AMA stands for Academy of Model Aeronautics, not American Model Association. Its job (in exchange for dues money) is to protect the interests of its members, and it doesn't always do this very well. On the other hand, I don't think it's realistic to expect it to have any clout when it comes to curtailing what is (assuming your facts are accurate) illegal radio operation on frequencies allotted to R/Cers. The sad part is that the AMA is supposed to work with the FCC so that problems can be solved. Unfortunately, this isn't handled well, either. More tragic, however, is the fact that even if the AMA were effective in communicating our needs to the FCC, we'd still come out losers, because the FCC has no means of enforcing the rules it creates. A slap on the wrist and an advisory note would probably be the best it could do.

Unfortunately, rules apply to everyone, and I bet that there are R/Cers out there saying, "I don't need to get my radios upgraded to the new channels. No one around here flies on 72.240 anyway. Who cares if it's illegal?; it's not bothering anyone, and I'm not going to change a perfectly good radio!"

The FCC has already told them it's illegal, but so what? The FCC, through the AMA, has advised this government contractor of the potential problem. What was his reaction?—probably the same as the modeler still flying an illegal radio on 72.240. Who's right? No one! What's the answer? I sure don't know, because the whole frequency situation is a mess, and I seriously doubt that it can be settled to anyone's satisfaction in the near future. Until everyone abides by the laws and regulations, problems like yours will continue and probably worsen. In the interim, we would be glad to hear about similar experiences from other members. We may not print them all, but we'll see that the AMA receives them. RAU

Svenson Models Distributor

I'm trying to locate a distributor for Svenson Models of Belgium, or an overseas address to which I could write directly. I read an article in another publication on one of its kits, "The Fieseler Storch," but no address or distributor was listed. They only mentioned that Svenson Kits weren't widely distributed in this country. I wrote to the publication, but have yet to receive a response. With all your resources, perhaps you can help?

JERRY W. MILLER
P.O. Box 2280
Wise, VA 24293

Jerry, I remember the Svenson line from years ago, especially the Storch. As I recall, they were complete kits, and the wood selection was outstanding. Like many other imported items, because of the escalating distribution costs and a rather small market, they're no longer marketed in the U.S. I don't know if they're still being made, but someone out there may have the kit you're looking for, so we're printing your entire address. RAU

BD-8 Search

I'm looking for a plan of the BD-8 designed by Jim Bede. I wrote to George Miller at Custom R/C Aircraft (a few years ago, he sold a 1/2-scale kit of the BD-8), but I've received no response. I've also looked through catalogues from Scale Model Research and Repla-Tech International. Do you know where I can find the plan?

BRETT HORTON
Vidalia, LA

Brett, check with Bob Holman (P.O. Box 741, San Bernadino, CA 90402) for a set of excellent 3-views that appeared in the British publication "Aeromodeler." I also remember a BD-8 construction article by Brit modeler Dennis Tapsfield; it appeared in an issue of RCM. Check with them. RAU

Collective Requirement?

I'm a 16-year-old R/C freak who has been in the hobby for almost two years. I want to buy a helicopter, but on my budget, my choices are limited.

The Cricket is a possibility. Its price is reasonable, but I don't know if it's a 5-channel helicopter that's able to perform inverted hovers,

(Continued on page 34)

FIFTY YEARS AGO

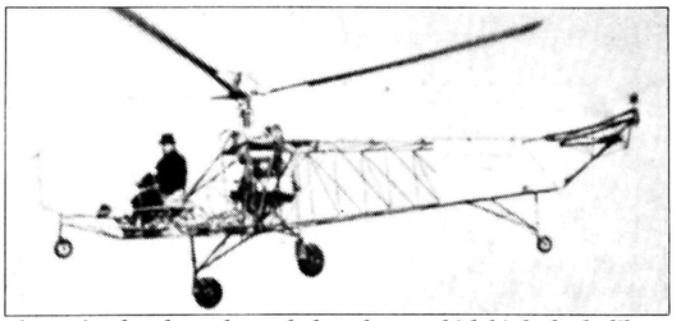
HISTORY, MYSTERY AND MORE!

by BRENDA CASEY

THE SEPTEMBER '40 issue of *Model Airplane News* was full of activity. The war in Europe dragged on, and the German forces were advancing. They leveled the Fokker plant in Rotterdam, Holland, but perhaps the facilities of this famous manufacturer were better destroyed than taken over to produce Nazi warplanes. In the U.S., the wartime demand for planes was high. North American Aviation's $84-million backlog forced them to work virtually around the clock, and Boeing (in Seattle, WA) was adding 75 percent more plant floor space.

The "Frontiers" column gave a glimpse of aviation's future. The first successful heli test flights had been performed at Vought-Sikorsky Aircraft. The crude-looking whirlybird rose vertically 30 feet, hovered, flew 200 feet and descended vertically! Engineers, however, were hesitant to say that *all* the kinks had been worked out.

Milestones were reached in commercial aviation, as well. Pan Am now offered flights daily to Argentina and weekly to Australia. The fastest scheduled air route ever?—LA to NY in about 14 hours! On its maiden flight, TWA's huge Boeing Stratoliner—a four-engine, pressurized-cabin ship that cost $1,500,000—covered the 2,600 miles at 215mph!



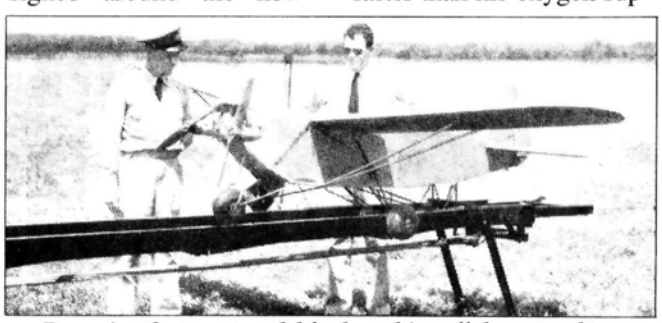
A man in a bowler and a crude, bare-bones whirlybird—looks like a Laurel & Hardy sketch!

CODE NAME: XB-24

Some innovations were kept more secret, not unlike today's B-2 and F-117 projects. On the cover 50 years ago was the U.S. Army's "mystery bomber"—the Consolidated XB-24. People heralded it as the greatest bomber in the world without knowing how good it really was. Its performance figures were classified, but *MAN* ferreted out some details. Designed around the new Davis Wing airfoil, this plane was meant for high-speed, short-range or reduced-speed, longer-range missions. It weighed 40,000 pounds and was powered by four Pratt & Whitney Twin Wasp engines, each of which drove a Hamilton Standard, three-blade, 12-foot-diameter prop. Its internal bomb bay could accommodate 9 tons of explosives!

Experts guessed about its true capabilities, estimating a range of 3,000 miles and a top speed of 350mph (because it outran Grumman F3Fs)! They made clever deductions, too: on the first high-altitude test flight, pilot Bill Wheatley nearly lost the sight in his right eye. The loss of pressure caused the blood vessels to give up nitrogen faster than his oxygen supply could compensate for the loss (a phenomenon known to deep-sea divers as "the bends"); nitrogen liberation doesn't occur in the eyes until 36,000 feet!

Were these aviation detectives right about the bomber's greatness? Well, the plane the army called "Bullfish" went on to earn the nickname of "Liberator," and along with Boeing's B-17 "Flying Fortress," it played a key role in WW II.



Preparing the target model for launching off the catapult.

UNCLE SAM BUILT A GIANT-SCALER

—and the Army wanted to use it for target practice! Developed at Wright Field for training pursuit pilots in aerial machine gunnery, the R/C plane was one-third of the size of an ordinary combat ship and had a 12-foot wingspan. It had a real gas engine and twin propellers, though, and its controls worked in the same way. (Maybe we'll see one at this year's IMAA fly-in!) Unlike the sleeve-type tow-target it replaced, the model could bank, climb and dive like a full-size plane. It was less dangerous, too, as there was no tow-plane pilot to be injured by stray shells.

The target model was carted around on a mobile unit and usually launched from a catapult. It had a ceiling of 5,000 feet, and on a signal from the ground, a parachute floated it to earth. It could also be made to land with a control box that had a dial like that of a

(Continued on page 60)

PILOT PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING!

$END IN YOUR SNAPSHOT$!

MAN is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable.

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of 1990. The winner will be chosen from all entries published, so get a photo or two together plus a brief description and send it in!

Send those pictures to: Pilot Projects, Model Airplane News, 251 Danbury Rd., Wilton, CT 06897.

A ZERO FROM THE LAND OF ITS ORIGIN

Terauchi Jun (Kobe City, Japan) is a 21-year-old modeler who really enjoys our "Small Steps" column. He built this Mitsubishi Zero from the Marutaka kit (Royal Products distributes most of the line here in the U.S.), and it's powered by an O.S. 10FP. This was his first attempt at scale, so he used it to work on his painting techniques, too. The 35-inch, 32-ounce A6M flies well and does all the basic maneuvers. Hai, Jun-san, domo origato! Ichiban!

CHARLIE ONE-FORTY CLASSIC

This pretty 1/6-scale Cessna 140 was built by Jim Coveney (Valley Stream, NY), who drew the plans from a set of three-views supplied by Cessna. Jim used conventional materials and even made a fiberglass cowl. The 65-inch-span model weighs 6 3/4 pounds and is powered by a Royal .40 ABC engine. The fifth channel is used to rotate the pilot's head as he "clears traffic" during takeoff and landing. Jim even had Cessna verify that 140s came off the production line in the white-and-red scheme he chose! Talk about perfectionism!

CURTISS ELECTRIC SEAGULL

No, it's not the prop manufacturer we're talking about; it's the model Ellis Grumer (Phillipsburg, NJ) scratch-built and the form of propulsion he chose. Complete with a geared AstroFlight Cobalt 40 and 21 900mAh cells, Ellis's Curtiss Seagull weighs 9 pounds and spans 66 inches. Ellis says he gets consistent 6- to 8-minute, "quiet and majestic" flights from a charge. That should put to rest the common misconception that electrics have no endurance!

NE PLUS ULTRA?

Take a slick-looking kitted airplane, add retracts, a sharp color scheme and a killer engine with a pipe, and what do you get?—probably something like this Great Planes Ultrasport 40 built by Gus Perez (Wayne, NJ)! Gus powers it with an O.S. .45 ABC and uses Spring-Air retracts. The covering is Pactra Formula U over Silkspun Coverite. The plane's all-up weight is 6 1/2 pounds, and Gus says it's "super fast." We don't doubt it!

RAPHAEL'S REVENGE

Protecting the turf, perched on the wing of this Airtronics New Era III built by Sandy Scott (Burnaby, British Columbia, Canada), is a Teenage Mutant Ninja Turtle. (Looks like Raphael to me, dudes!) To give his NE3 a top speed of 96mph, Sandy installed flaps, retracts and a piped O.S. .32. At 20 ounces per square foot, the wing loading is right in the sport-flier range, and Sandy says the plane's performance is only limited by the pilot. Kowabunga! Judging from the paint scheme on the leading edge, Michelangelo or Leonardo might have had something to do with it! If you know, Don-a-tello!

HEAD FOR THE MOUNTAINS

The Busch motif inspired Chuck Hofmann (Melbourne, FL) to produce this nicely finished, sport scale Ultimate Bipe. The effort is even more impressive when you consider its size. Believe it or not, it started as an Ace All Star kit, on which Chuck performed some cosmetic mods. The O.S. .20FP swings a three-blade Tornado 8x6 prop, and the landing gear was pirated from a Sig Kadet Jr. The finish is MonoKote and polyurethane paint. We were going to save this one for our upcoming "kit-bashing" issue, but we couldn't wait to show it to you!

CHAMPION OF THE INTERCOASTAL

We couldn't decide whether to use this photo in "Pilot Projects" or in our other publication, *Radio Control Boat Modeler*, but because Gary Newman (Ontario, CA) is a heli flier and *MAN* reader, here it is! Gary's Schluter Champion is one of the two he owns; by installing a Long Ranger body, he converted the other to scale. The one shown here, seemingly recreating a scene from "Miami Vice," has been flying for 2 years and was Gary's first heli. Having experienced only "two minor crashes," Gary is luckier than most of us. He credits "patience, practice and good maintenance" for his obvious success.

ASPIRING AIR-KNOCKER

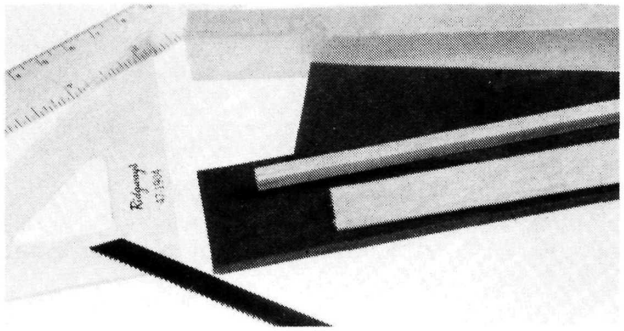
This Aeronca Champ by Maurice Taylor (Ohio City, OH) only needs to grow four times to be full-size, and if perseverance counts, it might just make it! Purchased at a swap meet, it had a wrecked fuselage and a Quadra engine, but Maurice restored it to the condition you see here. It weighs 18 pounds, and Maurice flies it at half-throttle because he thinks the Quadra puts out "far too much power" for scale-like flying. Hooray for realism! The wings and empennage are covered with MonoKote, and the fuselage is painted. It's nice to see the original Champ scheme again!

HOW TO:

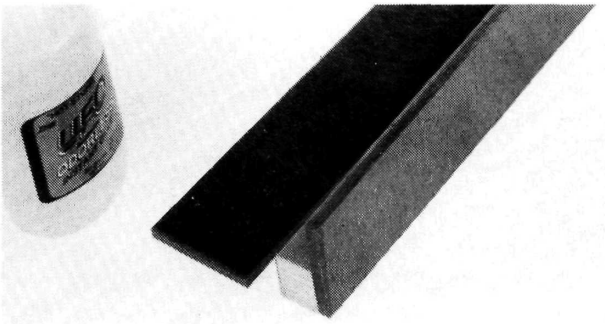
by RANDY RANDOLPH

MAKE A NOTCHING JIG FOR TRAILING EDGES

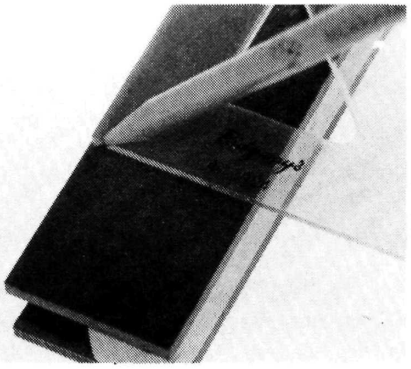
A much better trailing-edge-to-rib joint is achieved if the trailing edge is notched to receive the rib. For best results, the notches should be evenly spaced, of equal depths and exactly the width of the rib. The photos show how to make a simple jig that will do all this quickly and easily. The jig shown is for making 1/4-inch-deep notches, 2 inches apart, in 1-inch trailing-edge stock. Alter the measurements to suit larger rib/trailing-edge stock and/or wider spacing.



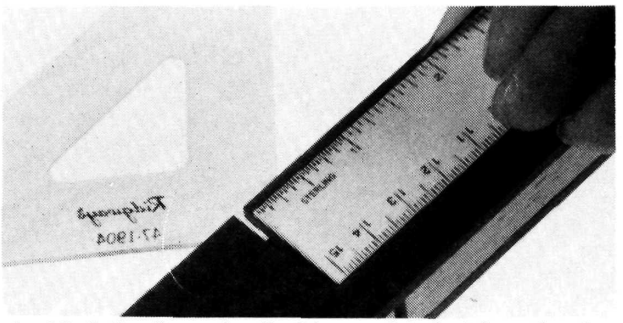
1. *Necessary materials: two pieces of 1/8x2x8-inch Masonite or hardboard; an 8-inch piece of 1/2x1-inch balsa or hardwood, a ruler; a square; and a saber-saw blade with 12 or more teeth per inch.*



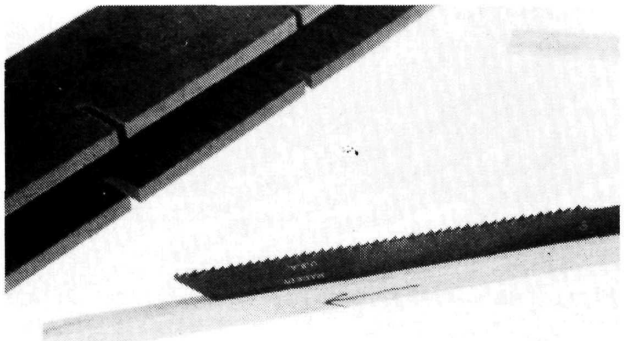
2. *Form a trough by gluing one Masonite piece to each side of the hardwood. A trough that's 1 inch deep and 1/2 inch wide will handle most trailing-edge stock. If you use wider stock, use a 1/2x1/2-inch piece of hardwood for the base.*



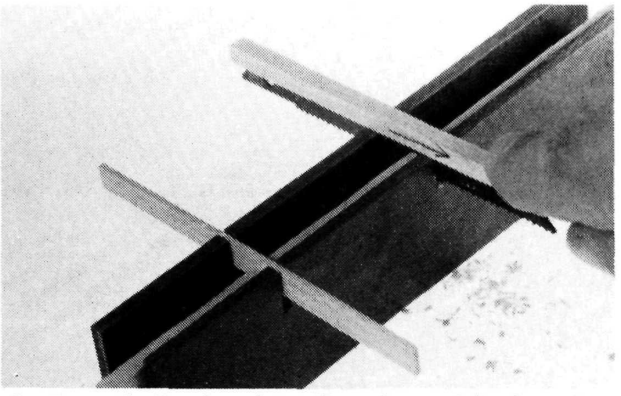
3. *Using the square, carefully draw a line on one of the Masonite sides, from the top edge to about 1 inch from the bottom. Again using the square—this time across the top—mark the other side to match the first. Make a vertical saw cut 1/2 inch deep and 1/16 inch wide across both sides.*



4. *Mark the rib spacing (in this case, 2 inches) from the edge of the cut, and make another vertical cut, just as before. The distance between the two notches should exactly match the desired rib spacing.*



5. *Use Hot Stuff to glue a scrap of 3/16- or 1/4-inch balsa across the top of the saber-saw blade. The blade will cut more smoothly in one direction than the other, so draw an arrow on the balsa "handle" to show the direction of the smoother cut.*

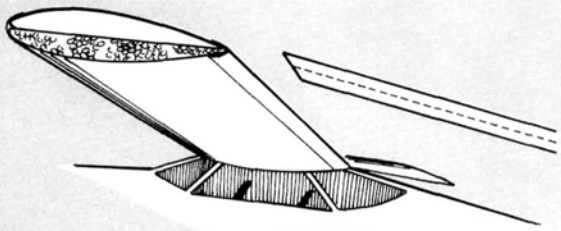


6. *To use the jig, place the trailing-edge stock firmly against the near side of the trough, elevating it with scrap balsa to achieve the correct-depth cut when the saw-blade handle is flush with the top of the jig. At the second saw cut, saw a notch in the trailing-edge stock, then move the stock so that you can anchor it with a piece of scrap balsa before you make the next notch. Follow this procedure for subsequent notches.*

HINTS & KINKS

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman, c/o **Model Airplane News**, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

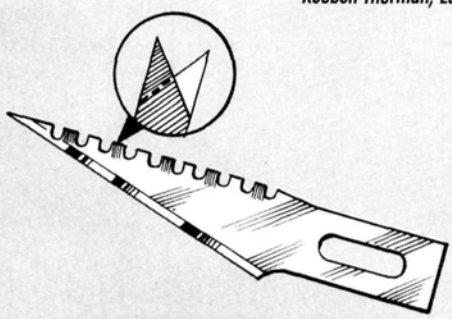
by JIM NEWMAN



INSTANT SYMMETRICAL WING

To improve the aerobatic qualities of his Aero-Star .20, this flier made matching bottom halves out of light-foam plastic, covered them with a low-temperature film, then used plastic adhesive tape to hold them on the bottom of the regular wing panels. The result?—a symmetrical aerobatic wing.

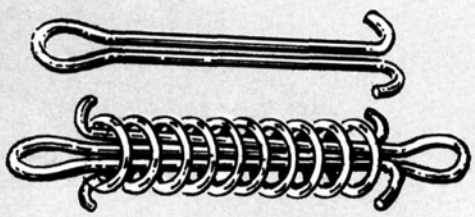
Reuben Thurman, East Point, GA



RECYCLED KNIFE BLADES

Carefully using a Dremel cut-off disc, one reader made this useful hinge-slotting tool from a worn-out no. 11 blade. Note how the teeth have been ground alternately left- and right-handed—the secret of its success. The sample he sent to me works superbly—first slitting, then quickly ripping out those fibers to produce a clean slot. Thanks, Will!

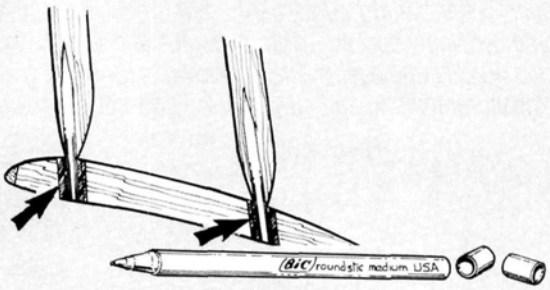
Will Sgarlat, Harwich, MA



COMPRESSION SPRINGS

Compression springs are much better on steerable tail wheels because they accept abuse. They're used on full-size aircraft, and you can make them by bending two wire fittings into the shape shown and inserting them into the springs from opposite ends. Jumbo-paper-clip wire is strong enough for this—even on large models. The final little hooks, which keep the fittings inside the spring, are bent *after* insertion.

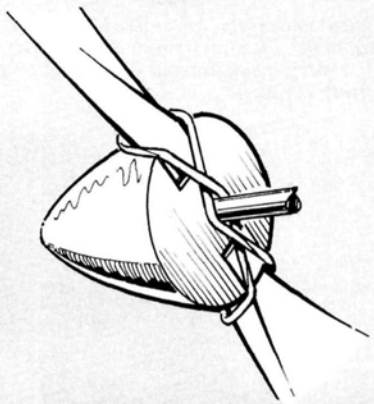
Gene Chase, Oshkosh, WI



BIC STRUT SOCKETS

The humble Bic pen. Cut into short pieces and securely mounted on the wings of this pilot's Tiger Moth, they readily accept the 1/4-inch dowel ends of his interplane struts-holding them firmly, but with some flexibility.

Tony Lego, Batavia, IL



POSITIVELY FOLDING PROPELLER

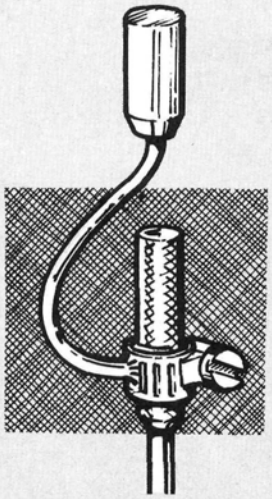
This flier had trouble getting his propeller to fold, because the inertia of the free-wheeling blades kept them extended. A light rubber band around the blades and across the rear of the hub is enough to initiate folding.

George Voss, Oklahoma City, OK

SOLO CERTIFICATE

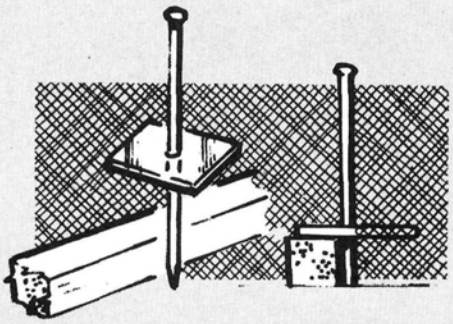
"It's a nice gesture to recognize a club member's achievement...," says Fred, a flight instructor. He found this artwork in a 1943 copy of "Fundamentals of Elementary Flight Maneuvers," which was then used by the Army Air Corp. Fred modified it slightly and had it printed on card stock, and he gives one to every "soloing" student. Ask at your local airport for similar certificates, or check the currently available computer programs.

Fred Schmidt, Livonia, MI



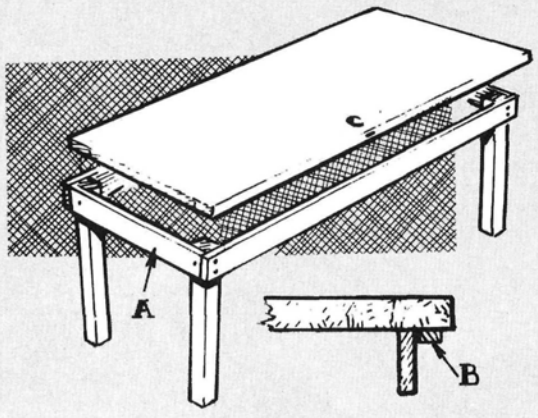
DUAL-CONTROL SYSTEM

In the absence of a "buddy box," this novel dual-control system works well on mode 2. A stiff wire is soldered to a small hose clamp, which is then clamped to a stick, as shown. Top this with a spare knob or dowel. To get a grip on the stick, you might need shim inside the clamp. A student can hold the stick in the usual way, while the instructor, standing behind his right shoulder, can easily reach around to make corrections to the top stick as required. It really works!



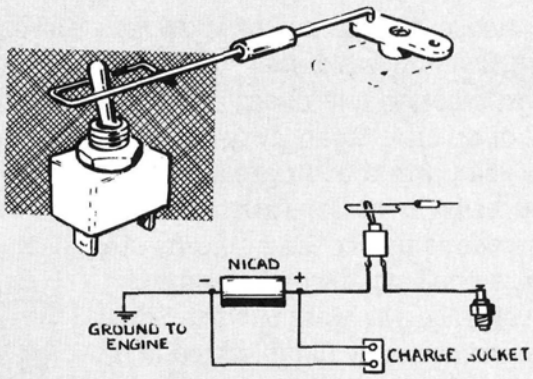
PROTECT WITH PLASTIC

Pieces of plastic trimmed from molded canopies, etc., and threaded onto pins will help you to clamp small sticks to a board without damaging them.



INEXPENSIVE WORK TABLE

Substandard hollow-core doors are relatively inexpensive and make excellent work tables. Set this one up with 1x4-inch framing and 2x2-inch legs. Only the pieces marked "A" are screwed to the legs, so the side rails can be unscrewed for storage. The door just rests on a frame and is kept in position by strips (B) that are nailed and glued to the underside in four places. Make sure everything is flat.

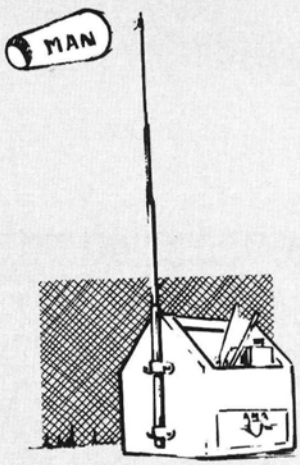


SWITCH ON? CONTACT!

Here's a transmitter-controlled, on-board ignition system with a difference! It doesn't need a separate on/off switch, so you won't burn out your plugs if you forget to switch off at the end of a flight. Throttling back to idle switches power to the glow plug, but advancing the throttle to half speed won't turn the system off. Turn off by moving the throttle to "high." Put a multi-pin plug in the system, and you'll be able to turn on landing lights, too.

TOY-STORE WHEELS!

Buy your Piper Cub, fat-doughnut-type wheels from the toy store. Found on Fisher-Price toys and molded in tough plastic, they're light and exactly the right proportions for your Cub and for old-timers too! Add metal-tube bushings and hubcaps made of domed, two-piece upholstery buttons.



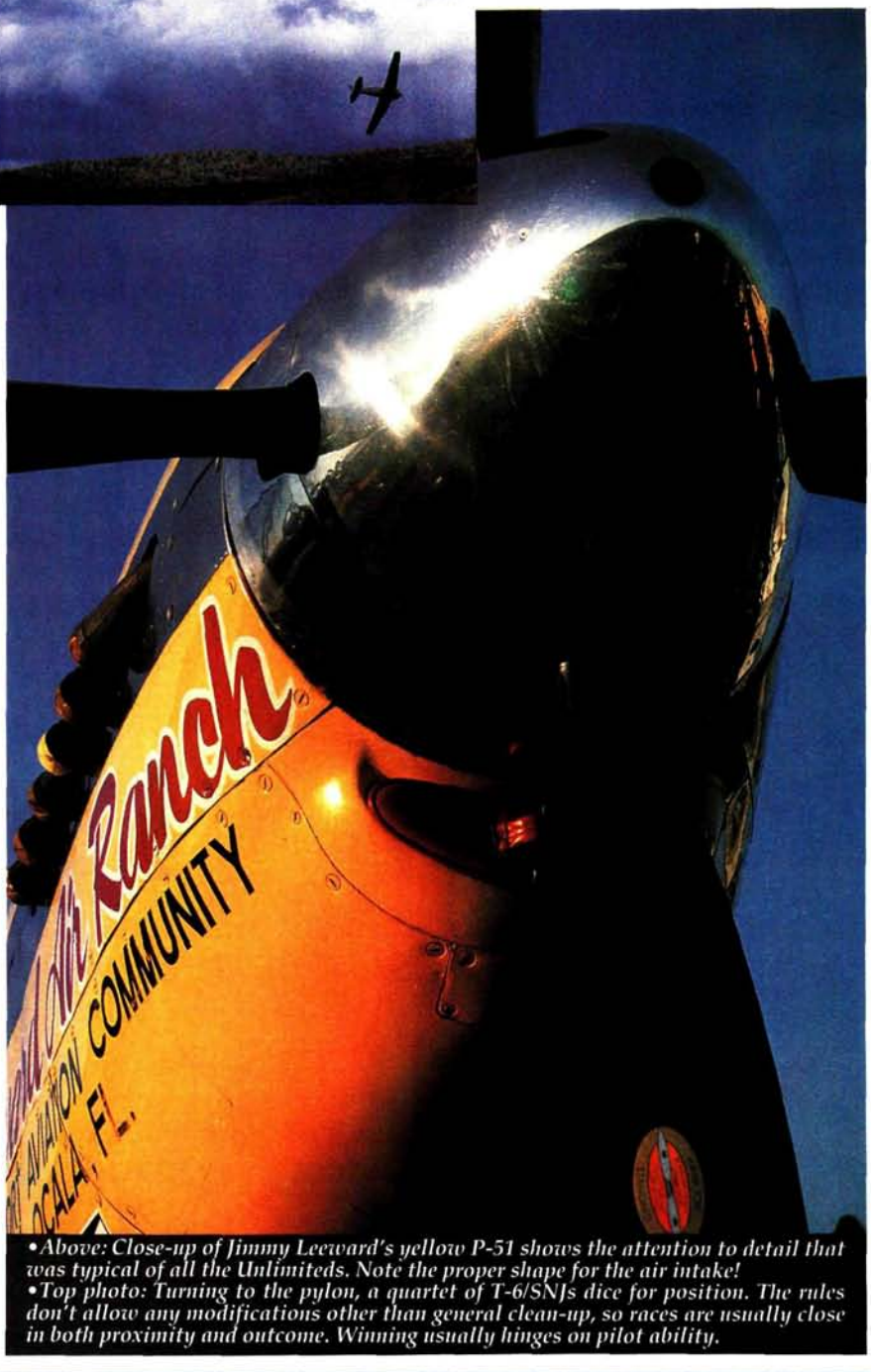
WHERE'S THE WIND?

An old telescopic antenna clamped to the end of a field box flies a small wind sock. This is a useful accessory, which can be shortened for transportation.

RENO AIR RACES

by DICK TRISTAO

THROTTLES TO THE FIREWALL, AND LEFT TURNS ONLY!



• Above: Close-up of Jimmy Leeward's yellow P-51 shows the attention to detail that was typical of all the Unlimiteds. Note the proper shape for the air intake!
• Top photo: Turning to the pylon, a quartet of T-6/SNJs dice for position. The rules don't allow any modifications other than general clean-up, so races are usually close in both proximity and outcome. Winning usually hinges on pilot ability.

A BRIEF HISTORY

The National Championship Air Races weren't always held in Reno, NV. The site was chosen in the early '60s when space, safety and cost became problems at its former site—Cleveland, OH. Does that ring a bell? Many historical aircraft have direct roots in the Cleveland Air races, and many were designated purely as Cleveland racers, no matter who owned, built, or sponsored them.

In 1902, the Wright brothers concentrated on making a machine that could fly, not suspecting the fearsome uses to which the device would be put in the future. The combination of a fascination with flight and a quest for speed led to the development of air racing, which, in the '30s, became a major spectator sport and provided the impetus for rapid developments. At that time, 200mph was unobtainable, but today, even the diminutive formula ships easily surpass that. Current air racing has been reduced to regional races (which are rapidly disappearing) and the Reno Air Races—the greatest air-racing spectacle and the aero aficionados' equivalent of the Indianapolis 500. The 26th Annual National Championship Air Races in 1989 generated as much excitement as ever, with classes of racing to suit any aviation enthusiast.

THE RACERS

• Biplanes

Biplane racing has been a part of Reno from day one. Tight power restrictions during the early years limited entrants to moderately powered homebuilts. In 1985, the rules were relaxed to allow engine displacements of up to 360 cubic inches and up to 180 horsepower. This opened the doors to factory-built bipes

(e.g., the Pitts S-1) and allowed existing machines to be modified to handle the additional thrust, loads and increased speed.

With the exception of wing area, airframe restrictions match those of Formula 1 racers. The minimum wing area is 75 square feet, and no less than 30 percent of the total area must be accounted for by the smaller wing. Other than that, it's up to the pilots or builders to coax additional speed from their machines.

Matched airframes and powerplants make for good racing, as, for the most part, the field of six or seven racers stay together on the same lap. Usually, when the leader is leaving the straightaway, the last-place airplane is just entering. In '89, 26 bipes qualified, and they provided plenty of competition. Speeds? In '64, the 1st-place Parsons-Knight Twister managed 144.57mph, but the '89 winner—Mong Wanna Play II—reached 196.40mph. The bipe race record was set in 1988 when Long Gone Mong reached 207.71mph! The most numerous entrants were Pitts S-1s, but there were also plenty of Mong Sports in the show, and highly modified Smith Minis (some modified so much I didn't recognize them!) filled out the field.

The always-exciting P-38 of Lefty Gardner nears a 90-degree bank angle diving to the pylon. The sound of twin Allisons is unmistakable.

Formula 1

Not much bigger than some modelers' efforts, Formula 1 racers are the smallest competitors at Reno. Stepping into the hangar that once served as Bill Lear's jet factory, I was instantly reminded of a model-aviation flying field: aromas; people hunkering over tiny airplanes; the buzzing of friendly chatter—punctuated by unkind references to one's maker or parentage! It wasn't very different from the workshop or flying-site atmosphere known by most modelers.

Formula ships are FAA-approved, experimental home-builts. Most are constructed like models and use similar materials: wood finished with fiberglass or molded-glass pieces. The competition rules specify the overall size of the aircraft and allowable powerplants:

- minimum weight: 500 pounds
- minimum wing area: 66 square feet
- landing gear must be non-retractable
- the prop must be fixed-pitch, of wood or composite fabrication
- engine must be stock 190-cubic-inch.

Adherence to these specs is rigidly enforced, so any refinements to increase speed are dependent on the builders' ingenuity. Continual changes to wing planforms, airfoils, cowl shapes, induction and exhaust systems, canopy shape, etc., keep racers busy as they try to do better each year and have led to increases in top speeds: 194.44mph in 1964 to 231.25 in 1989.

The brief races are exhilarating to watch—from racehorse, struggling-into-the-air starts to 50-feet-

The racing successes of the Trojan are few, but that doesn't prevent them from being popular with owners and spectators.

PHOTOS BY DICK TRISTAO

•Above left: The Jimmy Leeward race "9" Mustang is always competitive. Note the slippery look created by the modified low-profile canopy. There's just enough room for the pilot's head!. •Above right: Midgets are always popular, and their small-displacement powerplants deliver remarkable performance.

off-the-deck, 4G, knife-edge turns. Speeds increase on each lap, and this promotes frequent changes in position over the 3.1-mile oval course. Getting the checkered is usually close—frequently a photo-finish.

• AT-6

Among the most recognized WW II aircraft are the North American AT 6/SNJ series. Many of these trainers were built and used widely in the late '30s and early '40s, so a lot of them are still flying. Parts are readily available, and these machines will probably be around long after the P-51 is retired! You can seethis strong, powerful bird at almost any general aviation airport. That, and its visual appeal to diehard buffs and non-aviation people, makes it a perfect contender for sport racing.

The AT-6-class racer is the only completely stock airplane at Reno. Those are the specs and competition rules rolled into one. No modifications are allowed to engine or airframe. Speed increases must be gained through subtle lightening, cleaning, or spit-and-polishing, and this makes for the tightest, most exciting racing at Reno.

A minimum of six birds are air-started for a race around a 5-mile oval course. Along the straight, you can see all the contenders without turning your head! You'll see three or four aircraft jockeying for position, and it's the most dangerous race because their matched speeds keep them closely grouped. In 1975, a fatal midair collision illustrated the risks and prompted the in-

As you can see from the highly polished aluminum finish and pristine engine compartment, racers are impeccably maintained.

RENO THROUGH THE EYES OF A MODELER

From a modeler's viewpoint, visiting the Reno Air Races offers opportunities similar to other air-show/fly-in gatherings in that there's something for everyone. Scale fans, pylon pushers and aerobatics fliers all have their special interest "tweaked."

Obviously, the focus is on air racing, speed and aerobatics. Activities are non-stop, but the most interesting action happens backstage and before the arrival of the public. Saturday and Sunday are the best attended, and the program is modified for the public's entertainment and safety.

Before the weekend, flying is furious as everyone fine-tunes for the races and aerobatics demonstrations. At 4,000 feet above sea level, Reno has a thin, desert atmosphere, and this means that particular rules must be followed, especially if the weather is hot. Not only must racing machines be modified if they are to perform well, but aerobatics routines must also be carefully planned to compensate for the altitude, which robs engines of horsepower and makes control surfaces sluggish. After all, a pilot doing 35, flat, inverted spins doesn't want his recovery to be 17 feet under the sagebrush!

Military aircraft arrive early at the display areas, and their pilots do the sort of practice flying that isn't usually allowed by the military. Supersonic aircraft flash by in deafening low-level passes, and by their grins as they leave the cockpits, you know these military types love the assignment!

Two aircraft restoration facilities make their home at Reno-Stead. One

troduction of an overhead spotter plane from which instructions are given to pilots on the course.

As they traverse the course, the aircraft are directly in front of spectators, and after six laps, the heat is official and out comes the checkered flag. At the introduction of the T-6 racing in 1968, speeds pegged at 181.32mph but gradually climbed to a Reno record in 1988 at 232.14mph. When first manufactured, T-6/SNJs were given a military rating and had a 170mph maximum speed; obviously, TLC and careful tuning have gradually coaxed more performance from these stockers.

• Unlimited

Who would have thought that airplanes originally built to fly for about 100 hours would be rescued from post-WW II smelting furnaces and recycled, 50 years later, into sought-after racers? Unlimited racing at Reno is the ultimate—a sport unequaled anywhere today.

The most popular Unlimiteds are the P-51 Mustang and Hawker Sea Fury. One is a sleek thoroughbred sliver of aluminum formed around an in-line, V-12, turbocharged powerplant; the other is a tapered tube attached to a massive array of radially placed cylinders. Speed is what competitors and fans are there for, and the Unlimiteds don't disappoint. This is the class in which anything with a piston engine can compete—as long as it can maintain at least 400mph!

The P-51 is the predominant Unlimited aircraft, but a gaggle of round-engine ships often kick Mustang butt. Rounders include Sea Furys, Corsairs, Russian Yak-11s, AD-4 Skyraiders, Bearcats and, occasionally, a T-28. In-line-engine machines like the Curtiss P-40 and twin-boom P-38 share quarters with the Mustangs. New scratch-built designs are beginning to show up at Reno, with airplanes ranging from the competitive Tsunami (a P-51-style airframe) to the promising Pond Racer (a small P-38, twin-boom-style canard with a composite airframe), which is a product of Bert Rutan's ingenuity.

Racing in this league isn't for those with faint hearts or puny bank balances. Pushing the throttle a little too far, or tweaking the mixture a tad too lean can cause a $100,000 meltdown in front of the firewall! The 1964 winner—a Bearcat called "Miss Smirnoff"—was throttled through 376.84mph, but today, that speed will find you somewhere near the back of the pack. Since then, a list of distinguished Corsairs, Bearcats, Sea Furys and Mustangs has broken the record every year until the record 474.62mph was set in 1988 by Lyle Shelton's Rare Bear.

• Above left: "Old Crow," a restored P-51 in stock condition, showed up, had a race number put on its rudder and went pylon polishing!
• Above: Proving that stock can be beautiful is Gary Levitz's red-and-silver P-51. Gary has been racing for some time.

is the non-profit Nevada Air Museum, where you'll find beautiful, restored, WW I planes in working order. The other—CIA (Classics In Aviation) — offers us a close look at Russian aircraft: MiG-17s, 23s, a transport and several spotter aircraft. Some were red-tagged, as a special clearance sale was in progress. For a mere $190,000 (a little more than your average ducted-fan kit!), you could take home a gleaming MiG-21. The organization's facility, including the overhaul and restoration shops, was open to the public.

Among the many entrance displays were two by the Reno R/C Club, which was not only promoting the hobby, but also raising funds for its treasury. A steady stream bought raffle tickets for a ready-to-fly Byron P-51 and a Goldberg J-3 Cub. Event Director Don Bush says the club earned more than $11,000 at the 1988 Reno Races.

So, how do you attend this annual race? Contact the Reno Air Race Office* and ask for an information packet. Nearly all rooms within a 50-mile radius are booked a year in advance! Tickets can be ordered through the Race Office or nationwide, authorized ticket outlets. Spend the extra dollars and go for the reserved-seat season pass, and plan to stay through Sunday, as it's a full day of activity with an evening barbecue.

The four-day extravaganza is worth every cent. You'll see and hear many of your favorite aircraft performing in a way that can be seen only at Reno. Do it at least once in your life; you won't regret it!

RENO AIR RACES

◄ *Not all racing problems are engine related; the airframe can sustain damage, too. This race 97 Bearcat bent its vertical fin and rudder, and this makes it look like a Corsair wing!*

Eventually, the Unlimited class will contain only a few of the remaining precious warbirds; attrition will claim some, and museums the rest.

RACE TIME!

A black-and-silver Waco bipe bursts through the morning mist and roars upward: a stall turn, a half-roll to the right, then a pull-out to straight and level, 20 feet off the deck. It's 8 o'clock—time to get the show on the road.

Formula 1 racers and biplanes provide more heat races than the bigger iron, and their tighter course keeps them in sight during every lap—use your binoculars for the back straight. The speeds of the small craft aren't apparent until they scream impressively down the home straight. Heavier bipes handle the course better than Formula ships because they cope better with the rolling turbulence produced by the desert terrain. Warm days produce strong thermals and whirling dust devils, some of which pitch the diminutive aircraft so violently that structural failure leads to fatal crashes.

In this class, launching is by racehorse start. Ground crews struggle to hold the racers on line as throttles are pushed wide open in anticipation of the green flag. When the flag drops, tires start to roll and machines accelerate: some leap into the air; others run tail high. All wobble when airborne then cleanly gain the air speed they need. Some dive to ride ground effect; others fly high using quick shallow dives to overcome opponents. It's tight and tense and over all too soon.

At the checkered, noses point skyward and zoom high where cooler air soothes the cylinders. Led by a spotter ship, rumbling T-6s use the airborne start, and six birds make a heat. A green flag at the home pylon signals that a race is on. Lumbering behemoths slip and dive to minimum altitude (the top of the pylons), then wing tips begin their graceful arc to nearly knife-edge at the first turn. T-6 racing is tight!

The little bipes race in their own class, and this gives you an idea of their size—smaller than a Pitts, nowadays! Talk about short wingspans!

Stock machines produce similar power and air speed, so six start, six stay together, and six finish on the same half-lap. Rarely does a T-6 pull out of a race because of mechanical failure; more often, the pilot finds himself too crowded, or perhaps losing concentration. After the checker falls, gear and flaps crank down and recovery begins.

Legendary pilot R. A. "Bob" Hoover presides over all the Unlimited launches. Once airborne, he takes the collection of racers on a 10-minute warm-up/form-up flight. Radios crackle as pilots nervously discuss manifold pressures, temp-eratures, trim settings and fuel levels. Hoover herds them into a line, dictates speed and heading, then turns them north over a shallow valley known as "Hoover's Gulch." The volume of the Merlins' whine and radial chug-a-chug increases as the thoroughbreds make a shallow dive down the starting chute. Hoover's yellow P-51 pulls up from the pack and half rolls to inverted.

From the radio comes the official start, "Gentlemen, you have a race!" Throttles are moved forward to the stops, and all begin the position dance—moving downward, out, upward as pilots look for clean air in which to charge the course. Forty-five seconds later, the first Unlimiteds turn down the home stretch, slicing the air at nearly 400mph.

Some heats have a leader from the start, and everyone plays "follow that airplane." Other races see many changes in position and the lead as the aircraft trade burned-fuel weight for extra air speed, pilots find the groove, engines smooth out and some go sour. Brutal wake turbulence spreads the pack: it's eerie to see big metal roaring along at more than 400mph suddenly "popped" from being slightly banked to being nearly inverted! A growling Merlin is suddenly silenced and trails a thin white stream as it arcs skyward seeking "mayday" assistance from Hoover, who is orbiting overhead. By the end of the race, your nerves can't take much more.

Returning aircraft taxi past the grandstand to the sound of cheers and the click of cameras. It's time

to relax as an Extra 230 takes wing for a display of aerobatics. At the far end of the field, a few bipes are wheeled to the starting line, because the excitement begins again in 30 minutes!!

WHEN IT'S OVER

Reno is tense and exciting. Other air shows may provide equally well-prepared, impeccably restored aircraft, but ropes restrain the public—no touching or peering into cockpits. Reno eliminates

the pretenses. The pilots are here to race, and spectators can get close, smell the metal, touch a Sea Fury, or stand in the shadow of a P-38 wing.

Polished flying gives way to all-out aerobatics, daredevil wing-walking and 35-turn, flat, inverted spins. Warbirds whine and growl at throttle settings never achieved at regular air shows; the flying is lower and faster; and home-built machines, smelling of resin modifications made moments before, take wing. And it goes on for four glorious days. At the end, you have the official air-race hat on your head, 16 rolls of film to develop and five videotapes—all reminders that you have been part of Reno and have seen the fastest air-show competition in the world.

**Here's the address that's pertinent to this article:*
***Reno Air Races,** P. O. Box 1429, Reno, NV 89505.* ■

BASICS OF

OF RADIO CONTROL

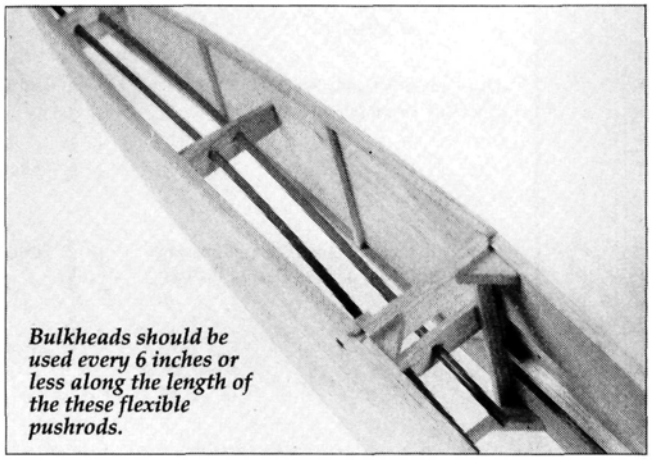
Nylon Pushrods

by RANDY RANDOLPH

ALL THAT ANY radio system can provide is the ability to transfer the pilot's instructions from the transmitter to the airplane's receiver. The receiver, in turn, transfers these instructions to a group of servos. From that point on, it's up to the modeler to provide a mechanical link between the servos and the control surfaces. This link must make the surfaces follow the instructions that the pilot gives to the transmitter.

There are three basic systems for transmitting the servo motion to the control surfaces:

- The first system uses rigid pushrods made of wood or fiberglass that have metal ends that connect to the servo and the surface.
- The second type, which is much more flexible, is made of braided cable or extruded nylon that slides inside a plastic sheath.
- The third system is a pull-pull system of two cables that are attached to both sides of the servo arm and to both sides of each control surface.



Bulkheads should be used every 6 inches or less along the length of the these flexible pushrods.

Of the three systems, the second is by far the most popular. The installation of this pushrod/sheath system is easy and lends itself to a number of applications that would be difficult to achieve with the other systems.

The instructions for these systems usually refer to the method of inserting threaded rods into the nylon pushrod ends so that clevises can be used for the connection between the servo and the surface. The instructions for installing the sheath itself (this is done during the aircraft's construction) are confusing. The following describes the installation of the rudder and elevator pushrod sheaths in a simple trainer-type design.

The same flexibility that makes the use of these pushrods appropriate for so many different installations also requires that the sheaths that enclose them be anchored at both ends and every 6 inches along its entire length. In some applications, the 6-inch spacing may be too much (e.g., in a 24-inch fuselage), and the anchors should be put closer together so that the pushrods won't bow.

To install the sheaths, establish the mounted height of the servo arms above the bottom of the fuselage. Note the direction of throw that will give the proper elevator and rudder movement (assuming your radio isn't capable of servo-reversing) so that it will be easy to locate the two holes in a bulkhead that will anchor both sheaths just aft of the servos.

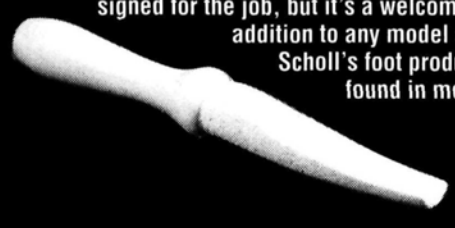
The aft anchor point will be the fuselage side itself where the pushrod exits to the control surfaces. This aft anchor should be located so there are no more than 2 inches of unsupported pushrod between where it exits the fuselage and the point where the clevis threads on. The measurement should be taken at the pushrod's greatest extension. The aft exits of both elevator and rudder pushrods should be located so that the pushrod lies in a direct line to the horn with a minimum of bending.

(Continued on page 60)

Nylon pushrod systems come in 2-, 3- and 4-foot lengths and are the most popular system used today.

WORKS ON ALL SORTS OF SKIN

This odd-looking tool is a rapid-cutting, non-clogging, sanding device that can be used around cowls, fairings and gussets. It wasn't designed for the job, but it's a welcome, inexpensive addition to any model shop. It's a Dr. Scholl's foot product that can be found in most drugstores.



AIRWAVES

(Continued from page 13)

which means that the collective pitch is under the flier's control. Can you tell me if it is? Collective pitch and inverted flight are a must for me. If I decided to get the Cricket, I'd buy the O.S. .32 F-HX with recoil starter. Is the recoil starter compatible with the Cricket?

My other choice would be Hobby Lobby's Sport 500. I've read that it needs only four channels stock, without collective-pitch control. I'm also familiar with the collective-pitch conversion for the Sport 500. How much is it? Would installing it enable the Sport 500 to fly and hover inverted? What attracts me to the Sport 500 is that I can supposedly use a .40- to .45-size airplane engine with it. I have an O.S. .40 FP airplane engine, and I wonder if it would be suitable for the Sport 500? Would I still use airplane fuel, or should I use helicopter fuel?

RAMAN EVAZIANS
Chicago, IL

Slow down, Raman! I'll try to answer your questions, but first I recommend that you do some additional research. Our book "Basics of R/C Helicopters" would be a good place to start. Neither of the two machines you mentioned is collective-pitch equipped. Although, as you've pointed out, the Sport 500 can be retrofitted with a collective head, the conversion would drive the cost up considerably. The Cricket is a fine little fixed-pitch machine, but the O.S. 32 would probably be too much for it.

If you're serious about flying helis and you want collective pitch for inverted work, why not look at the new breed of .30-size machines, e.g., Kyosho's Concept 30, Kalt's Enforcer, Miniature's X-Cell 30. They're the new wave in helis; they have all the current technology incorporated in their design, and they're not as pricey as the larger machines. They all perform the type of maneuvers you seem to be set on.

"Airplane" fuel and "helicopter" fuel are essentially the same blends. Some processors add dyes to the heli fuel so it can be seen in the tank a little more easily while the heli is airborne. The ingredients (methanol, lubricants and nitromethane) are the same, and they vary only in percentage and type of each. RAU

Kotula Covers Catch Kudos

It was the incredible covers by Jo Kotula that got me hooked on model aviation and *MAN* years ago. Anytime you feel the urge to re-use those great old covers, feel free! You can't do any better.

TOM WEISGERBER
Saginaw, MI

Thanks, Tom. Your letter is typical of dozens that we've received so far on the Jo Kotula story. Jo called me to thank all of you for the kind words, and we discussed his fond memories of his long-standing association with MAN. We're glad we could revive some of those memories for you. Thanks again. RAU

Catching Up

When I quit the hobby, Berkeley and Cleveland kits were in the hobby shops. They were mostly 6- or 7-footers with multi-channel R/C and chainsaw motors! I have a lot of catching up to do. I used to cover my planes with banana liquid, but nobody seems to know about it today. I'm building a 20-inch-span Sig Mr. Mulligan, and I want to paper it. What happened to banana liquid?

MANUEL NORIEGA
Oakland, CA

Manuel, the modeling guru who taught me all I know about building

is my Dad! He, too, is from the Cleveland and Berkeley school of modeling, and he gave me the straight scoop. Banana liquid has been pretty much replaced by clear dope of the nitrate or butyrate variety. To avoid warping the structure, he recommends that you use the "non-tautening" type for models as small as your Mr. Mulligan. For the same reason, he also recommends that you use alcohol to shrink the dry covering. It evaporates more rapidly and reduces the potential for warping the framework. All the necessary materials are available from Sig.

RAU

Bi-Tex (A "New" Old-Timer Event)

To have even more fun at SAM contests, I propose a variation on the 1/2A Texaco R/C event, which we'll be running at our contest at the Naval Air Station in Warminster, PA, on September 16. All 1/2A Texaco rules apply, with the following exceptions:

The aircraft must be a scale model of a biplane (or triplane) that was manufactured (the full-size one) prior to 1942. Fidelity to scale is to be judged from a distance of about 6 feet by the CD and two other SAM members. No drawings or other documentation are required, and any model not meeting the "spirit" of the event will be stepped on or disqualified.

Deviations from scale that are allowed: stab area, airfoils, dihedral and landing gear. Hand-launching will be OK. Maximum allowable wing area will be 360 square inches; minimum weight, 16 ounces. At the discretion of the CD, extra points may be awarded for aerobatics performed during the last minute of a max flight. (I've just about finished a Fokker D-7. I chose it

(Continued on page 88)

JET BLAST

Electric fans? What our readers are doing and a new T-2

by RICH URAVITCH

BECAUSE OF THE mail I've received and all the new developments, this installment of "Jet Blast" recaps items of interest to jet fans. Future columns will be prepared by recognized "names" and will consist of technical pieces, or "how-tos," much like Bill Harris's recent one about fuel systems. I have material from Bob Fiorenze and event coverage from Antonio Nunez. Bill will be sending additional material, so future "Jet Blasts" promise to be both informative and timely.

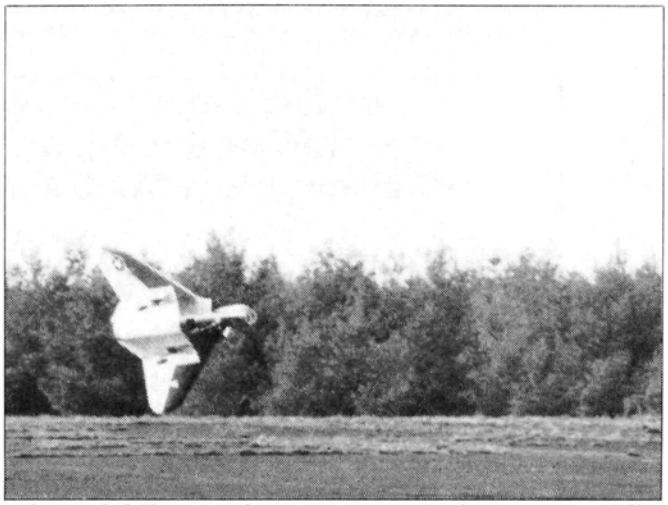
I'd like to hear from you about what's going on in your fan world. Don't forget photos; they'll probably be used here, or in our very popular "Pilot Projects" section.

EAGLE ENTHUSIASTS

Our "Field & Bench Review" of the Bob Parkinson Regal Eagle (July '90) brought a lot of response from readers, who agreed with our assessment. Chris Dellinger used the same Rossi .81/Byrojet package as we did and obtained a similarly impressive performance. Chris recommends that you beef-up the stabilizer-to-fuselage joint with ply, as he knows of two Eagles in which elevator flutter eventually caused their stabilizers to drop off. We're still flying ours and haven't had a problem, but we have a minimum hinge-line gap and well-supported pushrods. Thanks for the "heads up," Chris; I'm sure other Eagle drivers will find it helpful.

Tom Maddox also flies a Regal Eagle; his uses an OPS .80 and a Parkinson Vector fan. This is the first report we've had on this unit, and Tom seems to think it works well. This is significant when you consider that he's from Carbondale, CO, which is 6,000 feet above sea level! Any other "high-fliers" have info to pass along?

Mark Frankel poses with his Douglas F4D Skyray before its first flight. This scratch-built craft will be a construction article.



The Frankel Skyray performs an exciting "knife-edge" pass—difficult with a delta planform! Aft CG caused premature rotation and roll on the first flight, but the damage was easily repaired.

SKYRAY PROGRESS

A few issues ago, I reported on Mark Frankel's Douglas F4D Skyray project. Displayed at the WRAM show this year, it generated a lot of interest, and it will be featured in a construction article. Mark is already working on a second airframe, which will use the potent O.S. .90/Dynamax combination. For the first version, he chose a highly visible NATC test scheme of white and Day-Glo, which is scale, attractive and in accordance with the Tiano philosophy outlined in this month's "Sporty Scale." An aft CG made the Skyray's first flight a real experience and created some repair work for Mark, but everything has been sorted out. The Skyray will probably be at some East Coast fan flys, so watch for it.

SHRUNKEN SKYHAWK?

The little A-4 Skyhawk shown in the photo isn't from a Yellow Aircraft kit that was left out in the rain. It's an old, no-longer-available Midwest kit, which was originally designed to be powered by an RK-049 fan unit (also no longer available). This one meets all the requirements of Randy Randolph's "Small Step" airplanes, but I'm sure it will outrun them all! It was built by Bob Hill (Capistrano Beach, CA), who has competed three others. This one's just a little different: it's powered by a Kress* RK-720 fan unit that's driven by an O.S. .25VFDF engine. It weighs 3 pounds, 10 ounces, ready to go, and it's equipped with retracts and six servos!

Smiling Chris Dellinger of Vacaville, CA, sent us this shot of his Parkinson Regal Eagle. He says it's fun to fly and suggests some improvement mods.

Another Regal Eagle—this one from Tom Maddox of Carbondale, CO—uses an OPS .80 and a Vector fan to minimize high-altitude operation problems. Six flights so far.

Bob Hill (from Capistrano Beach, CA) with his fourth Midwest A-4 Skyhawk. Bob likes his jets small and fast.

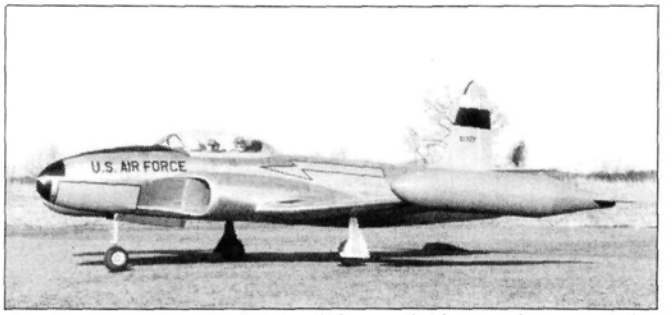
I spoke with Bob at Top Gun '90, and although he had logged only a few flights on the mini-'Hawk, he said it showed promise. He also said that, based on my reputation, he'd prefer *not* to let me fly it! Probably a wise decision, Bob!

Because of their reduced cost, size and complexity, there seems to be a resurgence in interest in smaller jets. Any other small-fan fans have anything to share?

IT WAS BOUND TO HAPPEN...

The electric fan has been on the minds of fan fliers and the topic of hangar talk in the "I wonder when we'll see..." category. No, not the Sunbeam variety that moves air around your workshop to disperse the fumes of CA and paint; I mean electric, ducted-fan propulsion systems! They're here, along with a couple of kits specifically designed to use them. To top it all off, the kits are sport-scale, not some sport ship with the fan unit stuck on top just to make it "the first ever electric ducted fan".

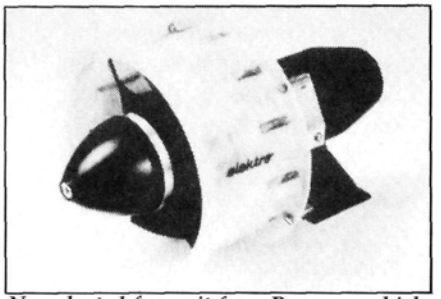
The kits—a MiG-15 and a U-2—and the fan unit are made by Bauer of Germany and are imported by Hobby Lobby*. The fan has a 4 7/8-inch rotor (about the same size as the Turbax and Dynamax units), and it weighs 13 ounces without the motor. The performance figures show that "up to 9 pounds of thrust" are available, but it's interesting that full throttle yields 16,000rpm for takeoff and climb, while most flying is done in a throttled-back state at 11,000 rpm. If the fan rotor can generate 9 pounds of thrust at 16,000rpm and it's strong enough to absorb additional power, what will using that rotor with a glow engine turning 18 to 19,000rpm produce? (assuming that rpm doesn't stall the blade). I'm just curious enough to want to try one in stock electric form!



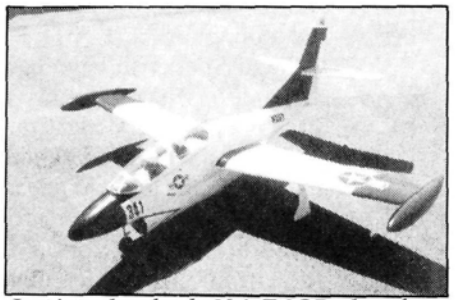
Ex-Sterner Engineering T-33 will be available soon from Specialty Mold & Model Co. It uses a Dynamax fan. The F-80 and A-7 CORSAIR II will follow.

NEW KITS ON THE BLOCK

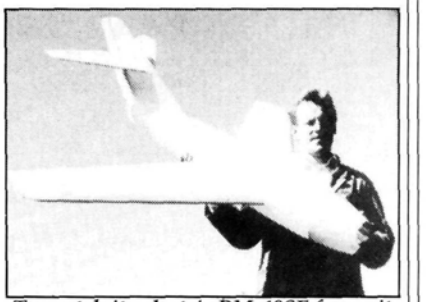
If you remember the old D&B T-2 Buckeye and have wished for its return now that there are reliable, tractable propulsion systems, you'll appreciate that a T-2 *is* coming back—not the old D&B, but an entirely new, 1/7-scale rendition from Spirit Jets*. Theirs is a "C" model that has an epoxy/glass fuselage, hatch, thrust tube and inlet liner along with foam cores, a clear canopy and all-wood parts. I built the original D&B version years ago, and it has always been



New ducted-fan unit from Bauer uses high-performance electric motors like Astro Flight's 40 or 60 or those from Graupner. Up to 9 pounds of thrust is claimed.



Just introduced—the N.A. T-2C Buckeye from Spirit Jets. Designed for standard 5-inch fan units like Viojett, Dynamax and Turbax III, it has a glass fuselage and foam cores.



To match its electric BM-40SE fan unit, Bauer offers this 58-inch-span MiG-15 with a light, epoxy/glass fuselage and internal ducting. It has a 713 square-inch wing and weighs 9 pounds. A large U-2 is also available.

JET BLAST

1990 JET EVENT SCHEDULE

August 25 & 26
Orange Airport—Orange, MA
2ND ANNUAL
NEW ENGLAND FAN FLY
Contact: Dwight Aube
(508) 384-7178.

September 15 & 16
Fort Worth, TX
SOUTHWEST FAN FLY
Contact: Dawn Buckley
(214) 264-4288 (days)

September 22 & 23
Lancaster R/C Club—Edwards, CA
2ND MUROC MODEL MASTERS
JET FLY-IN
Contact: Robert Sumoski
(805) 945-2410

September 29 & 30
Woodland-Davis, CA
4TH ANNUAL WOODLAND-DAVIS
Contact: Jim Ackerson
(707) 447-0127

September 29 & 30
Griffiss AFB—Rome, NY
RAAMS FAN FLY
Contact: Art Arro
(315) 339-2447 (eves.)

October 6 & 7
Metropolis, IL
SECOND ANNUAL
SUPERMAN FAN FLY
Contact: Jerry Caudle
(618) 524-9979

October 13 & 14
Sepulveda Basin Model Airport, CA
4TH ANNUAL WESTERN U.S. JET RALLY
Contact: Carl Stronberg
(818) 704-4600 (days)

November 17 & 18
Mesa, AZ
ARIZONA JET RALLY
Contact: Robert Ruff
(602) 892-1510

December 29-31
Deland, FL
JPO HOLIDAY FAN FLY

one of my favorites. We've come a long way, and this new release should be well-received. Contact Spirit for more information.

Another returnee—but this one's still around in its original form—is the Lockheed T-33 T-Bird. As we've mentioned, all of Sterner Engineering's molds and tooling for the T-33, F-80, A-7 and Sport Fan have been acquired by Nick Ziroli Jr. at Specialty Mold & Model Company*. He has been redesigning the kits, and he plans to release the T-33 and F-80 soon, followed by the A-7 Corsair II. The T-Bird in the photo is mine, and I built it from prototype parts. To eliminate the need for a cheater hole, it has been re-engineered to use the Dynamax fan with a fiberglass inlet system. It's great to see these kits becoming available again. For more information on price and availability, contact Nick Jr. directly.

Coming in future issues: Canadian Fan Fly coverage, Bob Fiorenze on positive-delivery fuel systems, Jerry Caudle tells you how to get superb finishes, and other news for fan fans. For peak performance, stay tuned!

**Here are the addresses of the companies mentioned in this article:*
***Kress Jets Inc.,** 4308 Ulster Landing Rd., Saugerties, NY 12477.*
***Hobby Lobby International,** 5614 Franklin Pike Cr., P.O. Box 285, Brentwood, TN 37027.*
***Spirit Jets,** 9255 Survey Rd., #12, Elk Grove, CA 95624.*
***Specialty Mold & Model Company,** c/o Nick Ziroli Jr., 170 Oval Dr., Central Islip, NY 11722.* ■

THE FORMULA 1 Midgets

A look back at the smallest of the air racers and the pioneers who flew them

by FRANK GUDAITIS

CLOSED-COURSE AIR racing with midget airplanes became a reality in 1947. This new, 190-cubic-inch class of racers was created in 1946 by some notable names in aviation: Ben O. Howard, Art Chester, Tony LeVier, Jacqueline Cochran, Roger W. Kahn, and the West Coast members of the Professional Race Pilot's Association.

These diminutive, single-place aircraft had to meet several requirements:

- minimum weight: 500 pounds
- minimum wing area: 66 square feet
- the airframe had to withstand at least six Gs in a pull-out from a shallow dive
- fixed landing gear
- non-controllable propeller pitch
- the engine was limited to a maximum cylinder displacement of 190 cubic inches
- engine modifications other than those approved by the manufacturer were prohibited

In the interest of safety, strict rules were also drawn up regarding the overall design, materials and workmanship used in construction. The airplane and its pilot were subjected to rigid flight testing before they were allowed to race.

In December 1946, the contest board of the National Aeronautic Association approved all these regulations. At the same time, the Goodyear Tire Company decided to sponsor a series of midget air races at the '47, '48 and '49 Cleveland Nationals. Each race offered a $25,000 prize, which was sufficient incentive for many backyard builders. As a result, the field for the '47 races was crowded with dozens of homemade racers. Unfortunately, most of the designs were poor, and the superior performance of airplanes made by old-time race pilots such as Steve Wittman, Art Chester and Tony LeVier soon eliminated much of the competition. This scene was repeated during the '48 and '49 races.

In 1948, the Continental Motors Company (manufacturers of the C85 engine that powered all the midget planes) sponsored a race at the Miami Air Maneuvers. The results of this race and the two in '49 and '50 were almost the same as those of the Cleveland contests. Steve Wittman and his airplanes won all three races. In '50, '51 and '52, three more

Continental Motors races were held in Detroit, andWittman finished 2nd in both the '50 and '51 events. John Paul Jones won the '51 race, with a spectacular display of pylon flying. In this race, Jones rounded the 2½-mile course and set a new record of 197.2mph. The last Continental Race in '52 was again a victory for the old master, Wittman.

Formula 1 racers did everything they could to reduce the overall weight of their planes. Typically, not more than 3 gallons of gas were carried aloft during a race. Instruments that weren't essential for high-speed, low-level pylon flying were temporarily removed, and some pilots even left their shoes on the ground and raced in their stocking feet!

Today, at 86, Sylvester "Steve" Wittman is indeed the grand old man of air racing. He flew his first air race in 1926, and his homemade airplanes were formidable competitors at the Nationals during the '30s—the "Golden Age" of air racing.

Steve invented the single, flat, steel-spring landing gear, which is now standard equipment on Cessna light planes and on many homebuilts. The curved, scimitar-shaped, racing propeller was also his idea. While Formula 1 rules prohibited the use of controllable-pitch props, they didn't prevent the use of mechanical forces and aerodynamics to slightly alter the blades' pitch. Unfortunately, resonance problems prevented this clever idea of "controlled twisting, or pitch adjustment" from being developed further. Wittman's very successful Formula 1 midget "Buster" is now in the Air and Space Museum in Washington, DC.

As a result of Bill Odom's tragic crash during the '49 Cleveland races, the big ships were banned from racing near populated areas. Consequently, for the next 15 years, the Formula 1 midgets were the only racers in the air. After the last Continental Motors race in 1952, air-racing events declined considerably, but by the mid-'50s, a small group of airmen had become dedicated to keeping air racing alive. One of these was a determined Finnish-born former airline pilot named Bill Falck. His red-and-yellow racer, "Rivets," was one of the ungainly and hopelessly slow homebuilts that appeared at the Goodyear Trophy races in the late '40s.

During the years that followed, Bill spent 10,000 hours reworking and refining his plane from an "also-ran" into a championship winner. Its top speed escalated from 148mph to well over 200mph, and with persistence and dogged determination, Bill and Rivets won many Formula 1 races over the next two decades.

Top to bottom: • The Long Midget (originally called the Midget Mustang) could even be built from plans. More recent versions have an added wing and are raced in the biplane class. • The master—Steve Wittman—provides a graphic illustration of the wingspan of his Bonzo racer. He pioneered the landing-gear design that bears his name and was used on most fixed-gear Cessnas. • The lineup at the '57 Ft. Wayne race shows how designs can vary, even when they're built to the same specifications. Foreground: Falck Rivets features T-tail. • The Mel Robertson Special, photographed at a '56 EAA fly-in.

Above left: •Refueling the Shoestring was a real stand-up act. To keep weight down during racing, fuel was kept to a minimum. Above right: •The famous Shoestring racer was a long-time serious competitor. No brakes—other than the human one at the tail!

After the last Continental Motors race in 1952, air-racing events declined considerably, but by the mid-'50s, a small group of airmen had become dedicated to keeping air racing alive.

Perhaps more than any other individual, Tom Cassutt (another airline pilot) was largely responsible for keeping this sport alive. He designed and built the first two Cassutt racers. His design was a thoroughly engineered and relatively easy to build Formula 1 racer. His construction plans were available for $20, and a lot of people sent for them. Many of today's Formula 1 midgets are still basically modified versions of his design. Tom freely acknowledges his indebtedness to Steve Wittman and to his fellow airline pilot Garland Pack. Some of the best features of their designs were incorporated into the Cassutt racer. Bill Falck once told me that he considered Tom to be a genius. Evidently, this opinion was shared by the president of TWA, who appointed Tom as his engineering advisor.

In 1957, Fort Wayne, IN, was the site of an air show with Formula 1 air races. It was an annual event until 1960, when, tragically, a mid-air collision of two Midgets rounding the scatter pylon at the start of a race ended the racing at Fort Wayne—and almost ended the sport itself. After this disaster, there were no more races, and it looked as if air racing was finished.

In 1964, Bill Stead, a rancher from Nevada, became very interested in the sport. (He also enjoyed driving unlimited hydroplane race boats.) Largely through his efforts and those of some Reno businessmen, air racing returned to the Nevada skies. The wide-open spaces surrounding Reno enabled the big, unlimited, WW II fighter aircraft to resume closed-course air racing.

With much enthusiasm, Stead also invited the Formula 1 midgets and homebuilt single-place biplanes to join in the Reno Air Races. Over the years, these events have grown in popularity, and attendance has increased to the tens of thousands. Once again, it's possible to enjoy watching the fastest sporting event in the world. ■

The cockpit furnishings on this Falck Rivets are typical. Even this instrument complement exceeds the norm. The airplane must have been a sport flier as well as a racer!

☆ ☆ ☆ ☆

The Reno Unlimiteds move to Arizona...on a slightly smaller scale!

The aircraft were all lined up in the center of the runway so that the spectators could pick their favorite for the People's Choice award.

MINI RENO WARBIRD RACING

by JIM ALLEN

Imagine a pace plane circling a 700-foot, two-pylon course with four WW II fighters following closely behind and slightly above it, itching for the start of the race. After three laps, the pace plane banks and pulls hard off the course, out of the path of the diving warbird racers. For the next 10 laps, the pilots fight for the lead while trying not to cut a pylon. On the final lap, the two P-51s, the P-47 and the Spitfire dive for the finish line. That's what a heat at the Arizona Model Aviators Warbird Mini Reno Race is all about!

After hearing about

the warbird pylon races in St. Louis, MO, the Arizona Model Aviators club (which is based in Mesa and hosted Top Gun '90) decided to try the concept. The final score is calculated in the same way—half static, half racing—but the course and the starting procedure are different. To increase its appeal to spectators, a 700-foot, two-pylon course is used, and the pilots stand off to the side.

For the start, a pace plane follows the three-lap procedure previously described. This type of start has worked much better than anyone had imagined. It allows safe, leisurely takeoffs for the sometimes tricky-to-lift-off scale airplanes, and spectators love it when all the planes dive for the line. It has also greatly reduced the attrition rate that you might expect from a racehorse start.

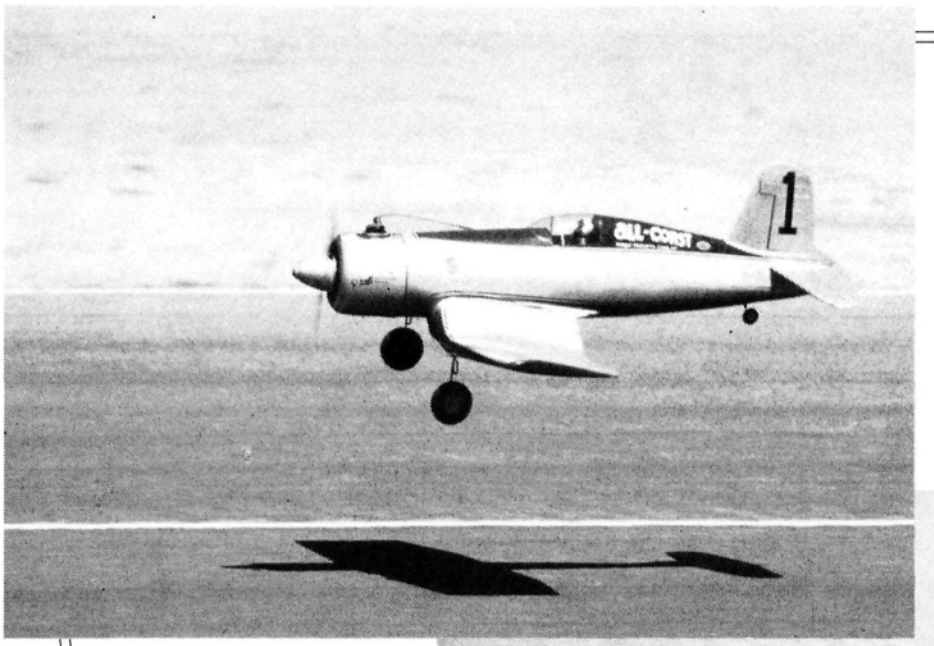
"...spectators love it when all the planes dive for the line."

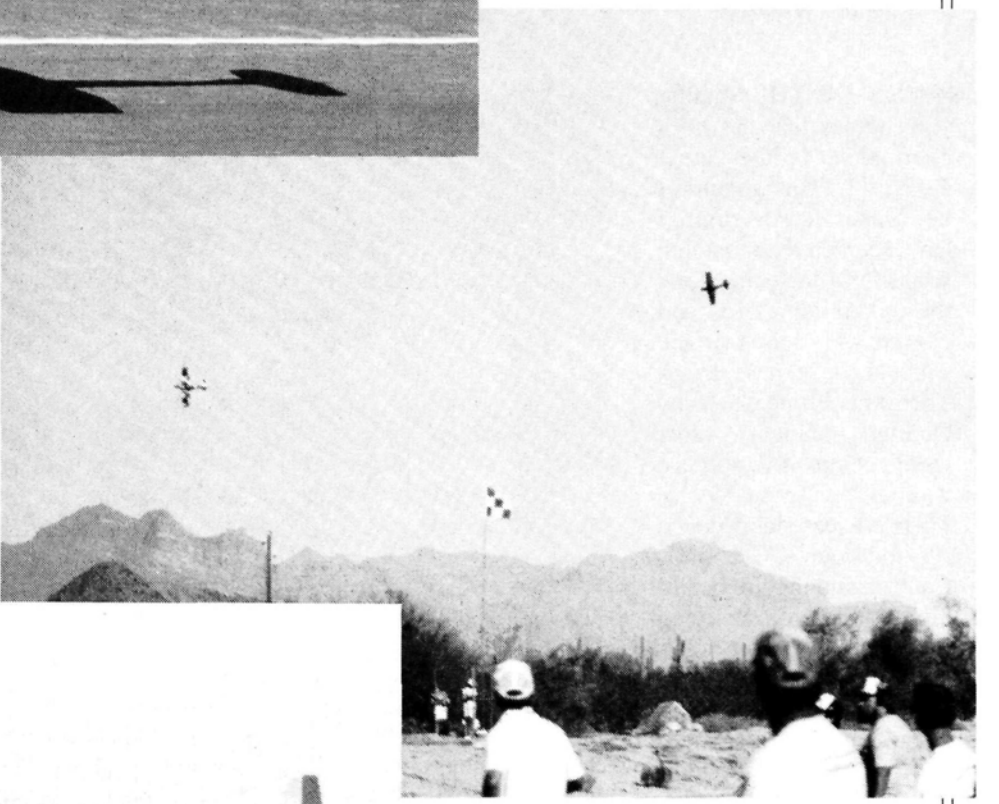
The sixth biannual race was held on September 9 and 10, 1989. The event has grown steadily each year, and,

■ *Below: Overall winners, from left to right: 1st place, Dennis Roeper; 2nd, Glen Heithold; 3rd, Michelle Boland; 4th, Darrin Frost; and 5th, Jim De Veuve.* ■ *Bottom: Larry Cranton's P-51 "Candy Man" was built from the House of Balsa wood kit and is powered by a Lee Custom K&B 6.5 with tuned pipe. It took the third highest static score and was the fastest aircraft at the event.*

Left: CD Bob Smith's EZ Dawg Red P-51 takes a ... only minor damage and was repaired for the next round.

MINI RENO WARBIRD RACING





■ *Above: Michelle Boland's Super Corsair about to touch down after another impressive flight. It was built from a Royal kit and powered by an Enya 1.20R 4-stroke engine.*

■ *Right: Planes belonging to Larry Cranton and Lewie Kear fly closely around pylon 2. Both planes were powered by a K&B 6.5 engine with pipe.*

■ *Below: Bud Wolfe's highly modified EZ P-51 (powered by a .60 20-stroke) comes in for another nice landing. Bud is an ex-WW II fighter pilot who has flown in all the warbird events.*

with 30 entrants, this was the largest contest so far. There was a wide variety of entries, including Spitfires, P-51s, P-39s, P-47s, Corsairs and Zeros. Some .60 2-strokes and .90 and 1.20 4-strokes were flown, but most of the entries were powered by .40- and .45-size engines.

THE RULES

The Mini Reno rules are fairly simple. Any model of a piston-powered, propeller-driven, military airplane is legal, and it may be painted in either a military or a civilian color scheme. A recent rule change also allows any non-military aircraft that has been flown in the Unlimited category of the Reno Air Races, so Tsunamis are now legal.

The model's wing area determines the amount of displacement a flier is allowed to use. A simple chart gives the area allowed for each popular engine size: 4-strokes are allowed twice the displacement of the 2-strokes. All 2-strokes must be front intake, and tuned pipes are allowed. If the pipe is mounted externally, however, there's a slight penalty in the static score.

First, the aircraft are judged by the AMA Stand-Off Scale rules that require proper documentation, i.e., three-views, photos, etc. Then, to score the other half of their points, the planes are raced around a two-pylon, 700-foot course for seven rounds. This course is very easy to fly, even for an average pilot.

STRATEGY

There are several approaches to this event. Some pilots go for a detailed plane (for a good static score) and settle for racing consistency.

(Continued on page 66)

SMALL STEPS

Little engines, struts and goodies

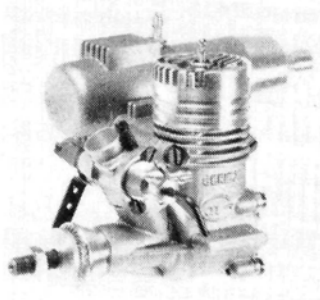
by RANDY RANDOLPH

The friendly Hugger lives up to its name.

PHOTOS BY RANDY RANDOPLH

ONE OF THE smaller engines that has been overlooked is the Super Tigre .11. This shouldn't be! Super Tigre engines have been on the modeling scene for a long time, and the old, reliable .15s and .23s are still hauling around small to medium airplanes. There was a time when any Quarter Midget racer wasn't competitive unless it was powered by an ST .15. There is a reasonably priced .11 for both R/C and U-Control, and they're beginning to show up at flying fields. The .11 is an excellent powerplant for airplanes that need .10- to .15-size engines.

If you're not familiar with a Super Tigre engine, you might think that something is wrong with it, because you probably won't be able to turn it manually, even with the plug removed. The piston is stuck in the top of the cylinder, and it isn't much easier to turn with a prop in its jaws and some oil squirted into the exhaust port. It will, however, start and run on the test bench, although it will still be tight after it cools, even after running a few minutes. If this is true of your .11, then you have a good one, but this characteristic has turned away a number of potential buyers. The .11 requires a long break-in, but if you follow the manufacturer's instructions, it will deliver a lot of revs for a long time.



Super Tigre has a dandy small engine that isn't really a secret.

The throttle is unique for a small engine because it has a high- and a low-speed needle valve. The low-speed needle, which is set at the factory, only needs slight adjustment after the engine has been broken-in. Once the proper setting has been found, Super Tigre engine carbs have a locking nut that holds the high-speed needle securely. The .11 is a class act!

Most of us have seen the Webra .10, which has been advertised with other Webra engines. It isn't available in this country because there's some doubt about the existence of a market for these small engines! Importing a new engine and its spare parts is a gamble, but the market is there, or the O.S. and Super Tigre engines wouldn't be on sale!

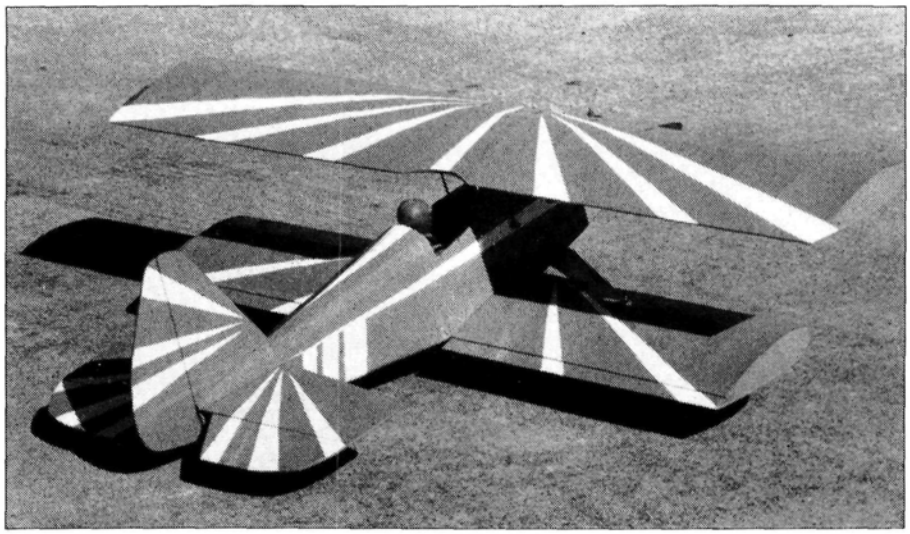
BABY BIPES SPORTING STRUTS

The little biplane in the Smith Miniplane series is the product of John Gill. He has devised several ways to adjust and set a biplane's interplane struts to allow the changes that flight tests showed were necessary. This .15-powered beauty has threaded struts that can be adjusted at the field, rather than in the shop. John has promised us an article about this system as it applies to the smaller bipes. The sooner, the better, John!

The following is from Dereck Woodward's last letter. Dereck is my British connection, and he's the one who's most responsible for the "small" movement there. He writes:

"I attended the Air Force Model Association Champs—a big score for the little models, I'm pleased to say. I only flew one aerobatic ship—a locally produced 48-inch-span kit job with an O.S. 25 FP up front. What a little cracker! We won a handicap pylon against a bunch of hot 40- and 60-powered ships

SMALL STEPS



Adjustable struts on this little bipe solve a wing-mounting problem that's common to all two-wingers.

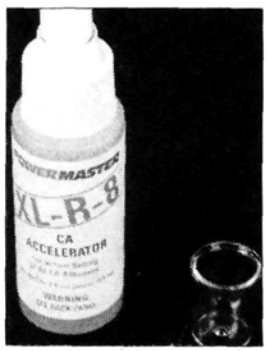
and pulled a 2nd in Sports Aeros (pattern). We used the low-level FIA turnaround schedule and flew against some pretty hefty models, but the one that really left me grinning was coming 5th out of 12 in FAI turnaround. The first four were all regular contestants, and then it was my turn. I had never flown the schedule before, and my little 25 was up against a bunch of OPS and O.S. long-stroke 60s with pipes, pumps, retracts and goodness knows what else. We made it through all the maneuvers (just), never flew out to the flying box and had a whale of a good time.

"The final kick was that I used only a little more fuel in a weekend of flying eight Aero rounds, two pylon races of just under 2 minutes flat out and a couple of crafty practice flights than the FAI winner burnt in *one* competition flight. Imagine *16* ounces per round!"

If anyone has been successful with a .25 (or less) in pattern, or in any type of contest against more powerful competition, please let me know. I'd love to help you brag!

Speaking of .25 airplanes, one of the pictures is of the "Hugger"—an original design by Wes Moore. The airplane has hundreds of flights to its credit and nearly as many pilots have enjoyed a turn at the sticks. It has a wing area of over 700 square inches and a wing loading of around 13 ounces per square foot. An aspect ratio near 7:1 gives a smooth, yet crisp, control response. "Comfortable" is the best description of this solid, forgiving airplane that will hold its own in the wind or ride the silk of the evening air with equal grace.

In the wish-I-had-thought-of-that department, check the name on Powermaster's new CA accelerator. Who could resist a name like that?—we couldn't! Actually, it was the price, not the name, that made the sale, but what the heck, it's a good name anyway. It doesn't fog up the shop when used, either! ■



Powermaster's latest offering—it's easy to remember the name!

1990 SMALL STEPS FLY-IN

In the photo, Joe Wagner looks on as Emmett Fry attaches the wing of his small-scale entry. Last year, they both arrived at the Small Steps Fly-In a day early to get in some extra flying. Wise move!

This year, the Third Annual Small Steps Fly-In (for airplanes powered by .25-cubic-inch, or smaller engines) will be held on October 13 and 14 at the same site—the Dallas R/C Club field in Seagoville, TX. As usual, the Fly-In is sponsored by *Model Airplane News*, the Small Model Airplane Lovers' League (SMALL) and the Dallas R/C Club, and once again, expert flight instructors will be there to offer help when it's needed.

For more information, contact Eddie Williams, P.O. Box 271048, Dallas, TX 75227.

SPORTS AVIATION

EZ Dago RED

In the Mustang tradition—sleek, fast and colorful!

by VIC MACALUSO

SPECIFICATIONS

Type: Sport-scale
Wingspan: 55 1/2 inches
Weight: 6 1/2 pounds (ready to fly)
Wing Area: 542 square inches
Wing Loading: 27.3 ounces per square foot
Power Required: .40 to .45 2-stroke; .60 to .90 4-stroke
No. of Channels Req'd: 4 (5 with retracts)
Suggested Retail: $360
Features: Excellent quality, detailing, flying, easy assembly. Comes 90-percent complete.
Comments: This is a "cutting-edge" ARF derived from the original EZ Mustang. It has the same great looks and performance, but it also has the attractive racing finish that's typical of the high-quality EZ line.

RACE-DAY PRESSURE! Pit frenzy—pressure! Equipment problems—pressure! "Hey Vic, can you do this review in a week?"—*pressure!*

By now, you should have realized that racing isn't one of the most relaxing pastimes. If you're the type of flier who just likes to cruise around the sky with a high-wing old-timer and communicate sedately with nature, this issue of *MAN* might not be one of your favorites; *but,* if the sight of Dago Red raises your blood pressure, then read on, my friends; you're perfect candidates for the wacky world of racing!

Racing is a very specialized activity. Whether you race sailboats or 500+mph planes, you need expertise and concentration. It requires a dedication that goes far beyond that of most casual activities—as well as a financial commitment. (An *unlimited* supply of cash usually isn't enough!)In any type of racing, the unlimited-class entrants are usually the biggest, fastest, most technologically advanced, and the most expensive! This is certainly true of the full-size Dago Red. The Sports Aviation* EZ Dago Red shows a similar commitment, but average modelers will enjoy it without having to suffer. The manufacturer has done almost everything for you—excellent quality, performance and looks for a modest investment of time and money.

KIT

The components are packed separately according to their function, so you won't mistake any of the hardware in this kit. The major airframe components are separately bagged in clear plastic and separated by cardboard dividers. A model's surface can be marred by sharp objects, so EZ's extra packing precautions are worthwhile. My kit had traveled quite a lot before I received it, but nothing was damaged.

I've built at least five EZ kits over the past few years, and this was the best yet. The quality of each component's construction and finish is the best I've seen in this type of kit.

This is an ARF, so you'll find only six major components: fuselage, two wing panels, stab/elevator assembly and the fin and rudder. Apart from the fin and rudder, the control surfaces arrive permanently hinged. You have to hinge the rudder to facilitate the installation of the tail-wheel assembly.

The other components are the fuel tank, vacu-formed cowl/turtle-deck/scoop moldings, landing-gear parts (including wheels), complete control linkages, and all the hard-

Contents of kit, neatly and carefully packed.

ware that's necessary to complete the airframe. This was one of the few kits of its type for which I did *not* have to make extra trips to the hobby shop for missing items. When EZ says "everything included," they mean it!

Sports Aviation has painstakingly recreated the detail of the full-size Dago Red—right down to the brilliantly finished red, white and yellow color scheme that's complete with panel lines and rivet details. It also has the same low-profile canopy and turtle deck as its full-size counterpart. Traditional EZ quality is evident throughout the kit. The molded nose cowling and canopy are trimmed to fit perfectly; in fact, no trimming was necessary to make any of these parts fit!

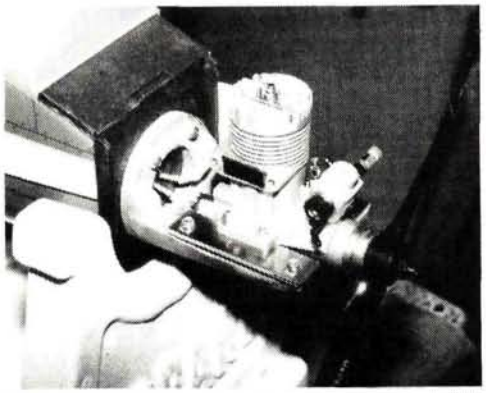
The control linkages were just as well-executed as the rest of the kit. The pushrod ends were pre-bent, and all the clevises, horns and spacers were supplied. To complete this kit, I had to buy a radio, engine, fuel tubing, filter and, of course, adhesives. More adventurous builders might want to try using only CA, but *make sure* everything is straight before you press the parts together. You only get one shot at it!

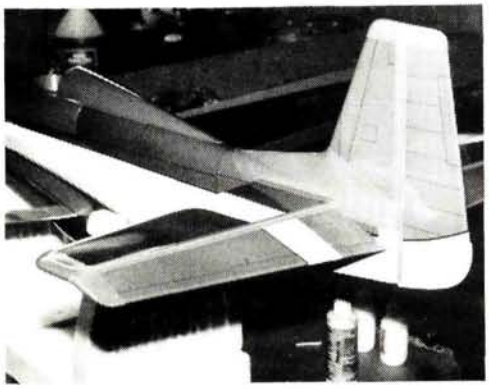
The kit comes with everything you need to install fixed landing gear. If you decide to install retracts, Sports Aviation recommends that you use its Supra-Fly 60 Retracts. I'm sure others can be made to fit, but you can't miss by following the

The Dago Red version of EZ's P-51 breaks ground cleanly on its initial takeoff.

COLOR PHOTOS BY RICH URAVITCH

The '51 shows its vivid colors on a high-speed flyby.





■ *Top: Universal mount makes it easy to install any size of engine, 2- or 4-stroke. Cowl and spinner not yet fitted.* ■ *Above: All the tail components mounted and ready for control-linkage hook-up. It's easier to install pushrods before you attach the stabilizer.*

manufacturer's recommendations.

ASSEMBLY

Only very *basic* assembly is required. Your only obligation is to assemble it straight and not be sloppy with the glue!

If you decide on the retract option, follow the instruction manual carefully. I've built two EZ kits with retracts and have found that *their way* is usually the easiest! The 16-page instruction manual is one of the most informative and helpful I've seen. It contains a complete parts list, more than 60 photos and illustrations, and *all* the info necessary to rig and trim this model properly for flight. All measurements are given in metric values, but there's a conversion table for diehards. (I *still* can't figure out what 35.5dm2 means!)

This manual is really quite comprehensive. You'll find a variety of tables showing recommended engine/prop combos, control throws and decal locations, etc. Because the kit is very easy to assemble, you can deviate from the sequence suggested in the manual without any dire consequences. Some of us just *have* to show *some* creativity!

The photos are very clear, and the illustrations are of engineering quality. This EZ Dago Red is definitely a class act!

FINISHING

There is *none!* To complete the construction of this kit, you have only to cut out and place the high-quality decals in the locations shown on the last page of the construction manual, install the radio, balance, and you've finished!

RADIO INSTALLATION

The Dago Red requires a 4-channel radio, but you'll need five channels if you want to install retracts. The supplied 1/8-inch ply servo trays will accept just about any radio without having to be modified. There's plenty of room, and with just about any installation, the model will balance properly without needing nose or tail weight. *Make sure you check the CG!*

PERFORMANCE

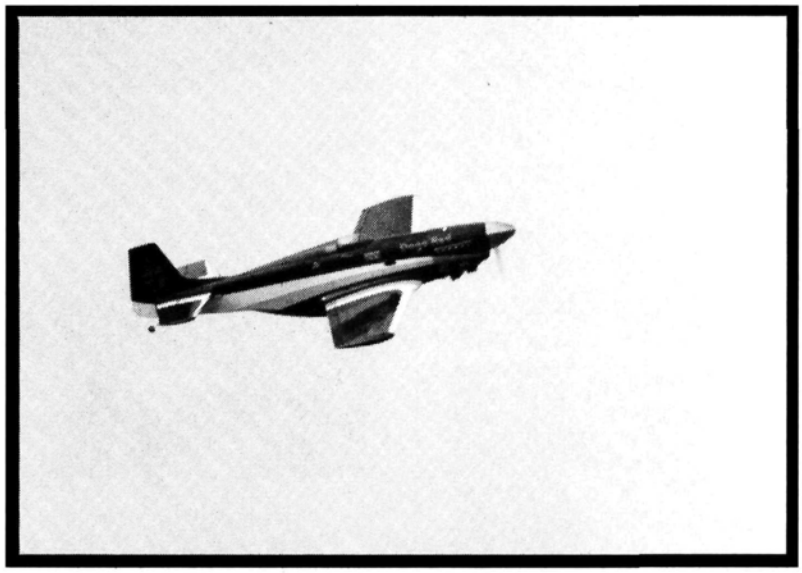
What we have here is a fairly small package with exceptionally good performance. Before I go any further, I'll warn the Walter Mittys

(Continued on page 56)

The full-size Dago Red is quite a piece of performance machinery, and so is the model. Note the speed—517mph!!!

I HAD TO HAVE ONE!

—A Reader Report from
BREN BAILEY of
Orono, Maine



FROM THE MOMENT I saw the first magazine advertisement for EZ's Dago Red, I knew I'd *have* to have one. Never mind that I had only been in the hobby for a year and could barely land a trainer. Never mind the warnings from fellow Northern Virginia RC Club members about the inferior construction and flying qualities of ARFs. I looked at the pictures and *knew* it was preordained.

Several weeks later, the kit arrived at our local hobby shop, and I snapped it up—along with an O.S. 90 4-stroke, a Futaba 7-channel FM system and retracts. I was immediately impressed by the components' outstanding finish, the accuracy and strength of the built-up internal structures, the completeness of the hardware package (which includes fuel tank, wheels, assorted fasteners and control linkages down to keepers and clevises) and the detailed, step-by-step instructions. One week of two- to three-hour nights and one rainy Saturday later, Dago Red was ready to fly, even if I wasn't.

For the most part, the kit went together very smoothly. I resented having to trim many of the plastic add-on pieces, e.g., the cowl, the wing-root reinforcements and the tail-plane fillets, to achieve a proper fit. I also tired quickly of cutting and sticking myriad decals, most of which I felt should have been on the fuselage and wing when the kit arrived. But installing the retracts (including making a servo pocket), threading linkages inside the pre-built wing, and bending and shimming the units themselves was challenging and enjoyable. They look great and function flawlessly.

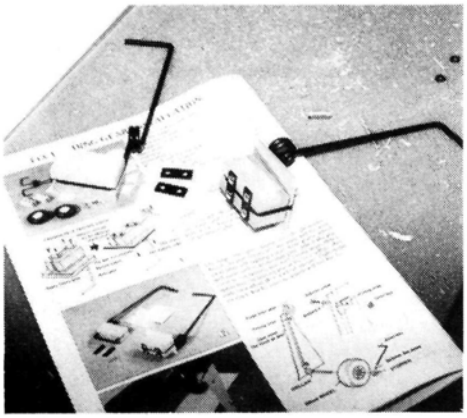
With the exception of installing the forked elevator control rod before completing the tail surfaces, I followed the EZ directions, and everything fell into place. Unfortunately, with all the parts joined, one problem stood out. The aforementioned molded-plastic pieces weren't all the same red, and none really matched the fuselage/wing finish. Further, the pressure-sensitive decals were significantly muted when applied to these pieces. This *is* stand-off scale, however, and the differences are difficult to see when the Dago Red is airborne.

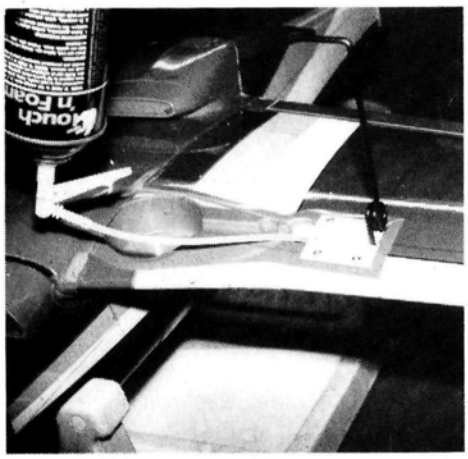
Finished weight, minus fuel, but with an Ace 1200mAh receiver pack, was exactly 6 pounds. Sandwiching the battery between the servos and the cockpit floor brought the CG back to the precise point indicated in the instructions.

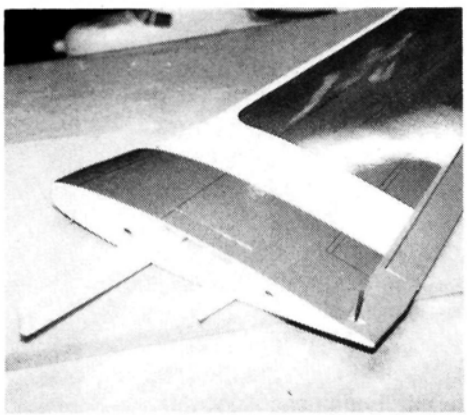
I asked Eric Clapp (a much more experienced flier) to handle the first flight and trimming. With the EZ-recommended throws, Eric found accurate and authoritative responses on all controls except elevator. After landing to reposition the elevator clevises, Dago Red was airborne again and Eric pronounced it "one of the best ships I've ever flown: stable in slow flight but capable of rock-solid aerobatics."

Before the afternoon was over, Dago Red had flown axial, slow and point rolls; inside, outside and square loops; and knife-edge. When I had persuaded Eric to give me the controls, I managed to do traffic patterns, procedure turns, Immelmanns, and split-S's. Despite being absolutely petrified by the immense area of sky the plane consumed on full throttle, I thoroughly enjoyed these basic maneuvers.

Since then, I've found scale-like takeoffs to be a breeze, with excellent ground handling and only a smidgen of right rudder being necessary. Flights have continued to be stable (even in wind) and truly exhilarating with full power. Before the flying season is over, I hope to make my first landing. So far, more experienced club members have had to help me here, since approach speeds tend to be high, and Dago Red definitely prefers to fly rather than stall into a landing. When I'm ready, I know the EZ Dago Red will be ready, too.

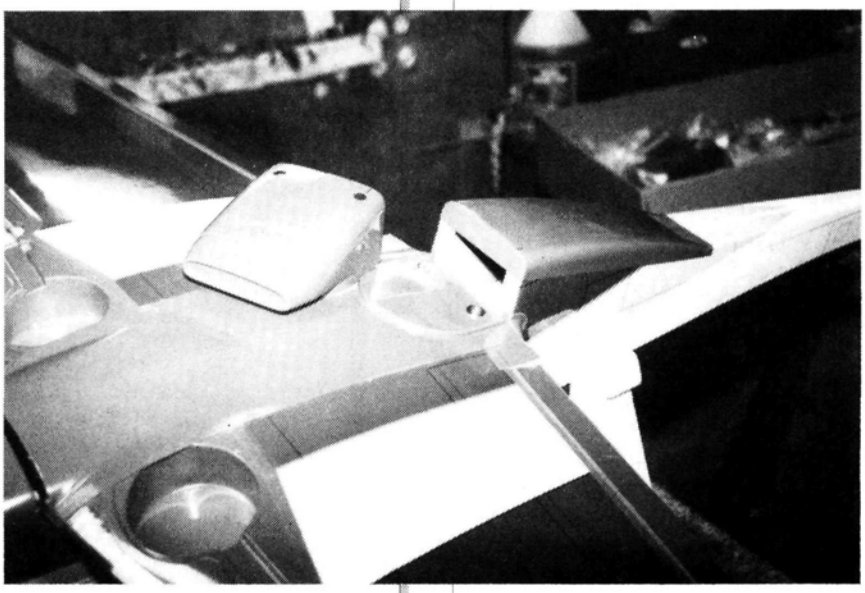






■ *Top: Fixed landing-gear assemblies ready to be mounted in the wing.* ■ *Middle: For added strength, the single-part aerosol foam was injected into the wheel-well cavity.*
■ *Bottom: The wing panels are joined by a pair of dihedral braces, one ply and one balsa.*

With the wing temporarily bolted into place and aligned, the vacuformed belly scoop is attached.



who are still in the trainer stage that they need experience with one more intermediate-level plane before they try this one. Although it isn't difficult to fly, it will be able to get ahead of novice fliers. The Dago Red's performance is definitely too zappy for beginners! With the obligatory warnings out of the way, let's get down to some serious flying.

The Dago Red has a wide landing-gear stance like the other EZ warbirds, and this translates into terrific ground handling. At idle, you can taxi around without feeling much effect from reasonable crosswinds, and you'll usually be able to avoid scraping your wing tips during the inevitable crosswind landings.

At the moment of reckoning, opening the throttle produces the usual yaw to the left, which I easily corrected with moderate, but diminishing right rudder as the plane accelerated. With the O.S.* 50, the Dago Red was airborne in less than 75 feet, but I kept it on the runway longer than necessary to build up speed. (Good insurance for a first flight with a new plane!)

Climb-out was straight, positive and fast. Once at altitude and trimmed, (very little was necessary), I checked its high- and low-speed reactions. As is expected of a model of this size, power, and wing loading, the stalls were clean, crisp and straight ahead (no surprises here!).

The high speed was spectacular. The O.S. 50 is a lot of power for this model, but it's certainly not excessive. If you like a spirited performance, I recommend it. Keeping in mind the wing loading, landings should be kept slightly fast until you're confident. They aren't beyond the capabilities of the average sport flier, but it's better to be on the safe side. It's really too pretty to ding!

Given the time in which I had to work with this model before writing my review, I couldn't have built an easier one. From opening the box to being ready to fly took 13 hours! Yes, I am an *animal* in the workshop but anyone can easily build and trim this plane in a week of evenings.

My overall impression of the EZ Dago Red is very positive. It's easy to assemble; it has exceptional flight characteristics; and it looks damn good! What more could you ask?

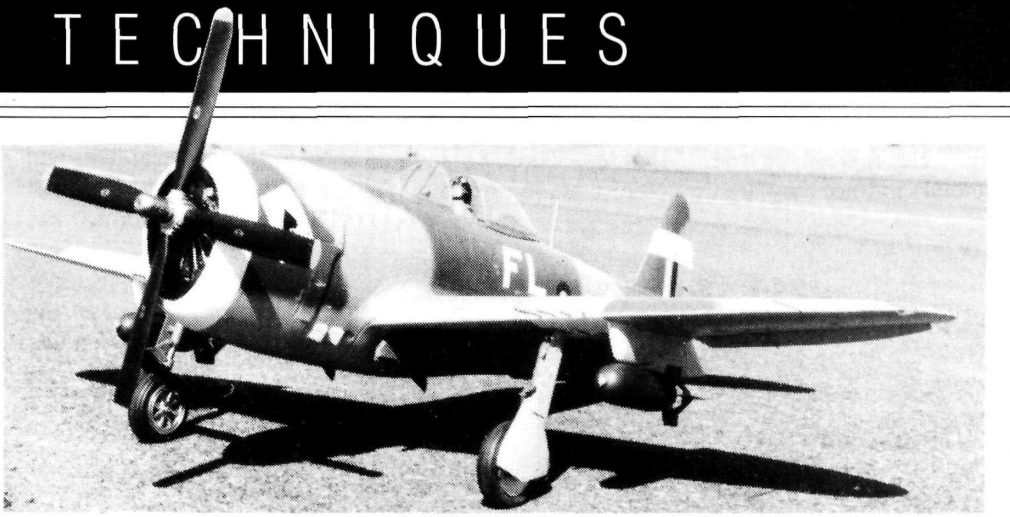
**Here are the addresses of the companies mentioned in this article:*
Sports Aviation; *distributed by Global Hobby, 10725 Ellis Ave., Fountain Valley, CA 92728.*
O.S. Engines; *distributed by Great Planes Model Distributors, 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.* ■

SPORTY SCALE

TECHNIQUES

by FRANK TIANO

Color can make the difference; great vibes; and other news



This unusual RAF scheme makes John Smith's P-47 Thunderbolt stand out from other Jugs. Small, two-tone British roundels (Southeast Asian theater) are even different from the more usual red, white and blue variety.

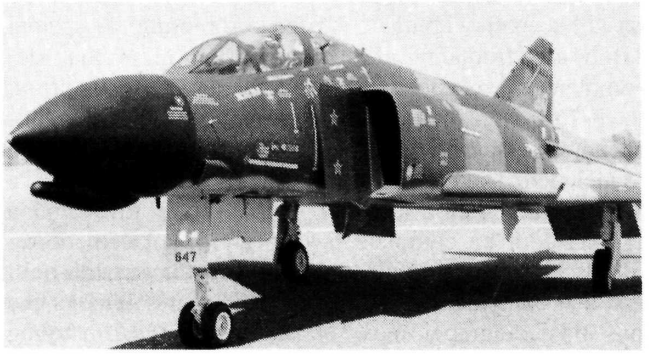
WHILE I WAS WONDERING about what to write for this month's column, Mike Richardson's pictures from Top Gun '90 arrived. Then it came to me; how about a discussion of color schemes? You don't have to produce a perfect scale model to make an impression at the local field. You'll find that a stunning (no pun intended) color scheme (especially an unusual one) on even a not-so-scale model does wonders for its looks. At Top Gun '90, several pilots entered unusual subjects. Earl Thompson brought a Whirraway Australian-built T-6. It was done in a scheme that we had never seen before on a standard T-6, and everyone was impressed. Larry Wolfe took a somewhat different approach. His good-looking F-4C Phantom was done in a typical Nam color scheme of greens and tan, but what made it stand out was that Larry used all that small, white stenciling. He finished it with some unique personal markings and some colorful unit badges and stripes—the makings of a real showstopper. You can do the same with your stand-off-scale model, even if it's a "35-footer"!

John Smith built his P-47 from an old Baker kit. He chose a Southeast Asian, British WW II color scheme that consisted of light- and dark-gray topside and a light-gray below. A white band around the cowl; wide, white stripes chordwise on the wings; a white fin and rudder stripe and two-tone blue insignia completed the package. (A whole new effect, don't you think?—reminiscent of Shane Cramer's Royal Navy Corsair that I showed you a few months ago.)

Metal-finishing aircraft is also worth the extra effort. Instead of just painting your favorite P-51 silver and slapping on a quartet of stars and bars, liven things up a little with some color. Charlie Chambers proves my point with his award-winning, aluminum "Big Beautiful Doll." If you don't want to take a course in sheet-metal working, then go ahead and paint the airplane silver, but don't stop there! Little splashes of red, white, black and yellow can do wonders for all-aluminum airplanes. It's not difficult; just a little more time-consuming.

These variations on color schemes aren't necessarily for warbirds only. Take Chuck Fuller's Top Gun entry, for example. He could have painted his Super Stearman in the usual red scheme, or in a racy yellow. After a lot of research, Chuck chose a color scheme he just couldn't resist—burgundy, silver and black with lots of writing and emblems. Sure, it took some extra work to mask the color scheme; sure, he had to wait for hours between coats of paint; sure, there were times when he wished he had chosen the all-red scheme, but the extra effort was obviously worth it.

I'm working on a more in-depth article on camo schemes and unusual civilian paint jobs. Until then, beg, borrow, or buy a book about your aircraft, and check out some color schemes.

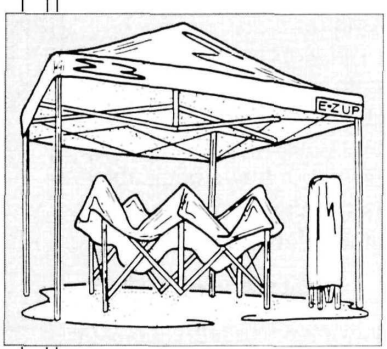


Close-up shot of Larry Wolfe's F-4C shows standard TAC camo with extensive panel stenciling and placarding. Beautifully done model received high individual static score at Top Gun '90. Crew seems slightly oversize. (Photo by Mike Richardson.).

GIMME SHELTER

I just have to tell you about my new toy. If you attend a lot of contests, fly-ins or fun flys, you know how miserable it is to be out in the hot sun.

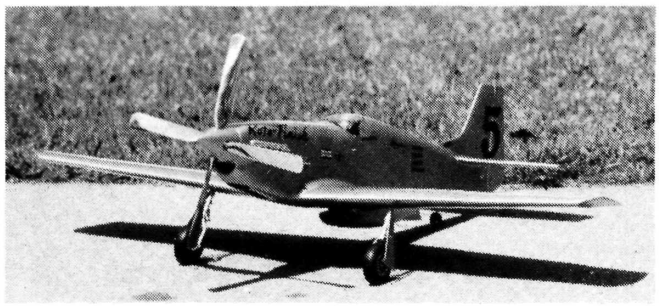
Maybe you have one of those rinky-dink tents that take four guys 40 minutes to erect and a 4-second, 4mph wind to knock down! I saw an ad in High Flight for a new, fully collapsible tent from John Peck Leisure Products*. No, this isn't a commercial, and no, they aren't cheap. They are, however, fabulous! They come in a variety of colors and sizes, they have a metal frame, and, what's more, two wimpy individuals can latch onto either end and put one up in less than 60 seconds. When we went to Tampa for Bill McCallie's King Orange Scale Masters qualifier, we took the tent (it comes with its own reinforced vinyl bag). I wish you could have seen the expressions of the people next to us when we pulled out this 4-foot-long bundle, took the blue cover off and erected the 10x15-foot tent in less than 45 seconds!



Sunshades are ideal protection for you and your models. Temperatures inside fuselages can easily reach over 125 degrees—a real equipment killer.

GOOD VIBRATIONS?

I put a new Zenoah* G-62 on the front of my 28-pound Kawasaki KI-84 and found that I needed a crankshaft extension. So, my machinist made one that was approximately 3 inches long. The resulting vibration nearly shook the big fighter to pieces! The solution? Either remove the crankshaft extension and make a whole new cowl/dummy engine fixture *or* install a set of Davis Diesel's* Iso-Mounts. I chose the latter, and I must be honest: although it didn't cure my vibration problem, it did eliminate at least 75 percent of it. As it turned out, the extension had far too much run-out for these vibration dampeners to work. Since then, I've made a small compromise: I shortened the extension, altered the dummy engine to clear the G-62 and kept the Iso-Mounts. Everything is fine now. Good vibrations? You betcha!



Typical of the Warbird racer is this modified P-51. Spirit of St. Louis Club and Arizona Model Aviators hold races. See coverage elsewhere in this issue. An enjoyable event!

TWIN-TAILED TERRORS

I can't believe the amount of mail and phone calls I've received about Nick Ziroli's B-25. Please, guys—I don't make the darned thing! With this in mind, cut out the following information and tack it to the inside of your glasses, or copy it in reverse and staple it to your forehead. Hangar One* has Ziroli B-25 kits in stock! The price is $460, and that includes all the wood pieces, vacu-formed clear parts and fiberglass components. Robart Manufacturing* has B-25 retractable landing gear in stock, and it includes all the parts, except the wheels. You can contact Tom Wilkinson at Hangar One or Tom Walker at Robart.

NEWS-BREAKERS

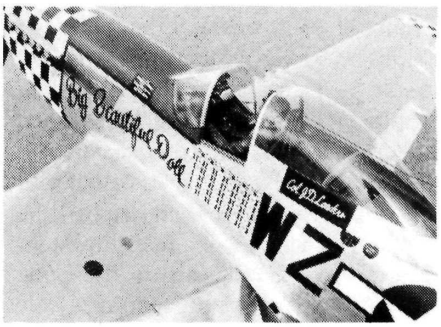
Bob Violett's* true scale F-16 is now available. The kit has pre-built wings, all tail feathers and some of the highest quality glasswork you'll ever see. I saw it fly, and it's impressive. It can fly so slowly that you can almost mosey out to the runway and snatch it out of the air; it can also fly so fast that there isn't much that will keep up with it!

Bob is introducing the "complete kit" concept with the F-16—even the very special, true-scale retracts are included. There's also a special flying stab, a landing-gear-door kit complete with its own little air cylinders, and complete instructions and photographic aids. If you're quick, you might be able to grab one of the first-run kits.

ANSWERING THE QUESTION...WHERE ARE THEY?

Ramon Torres is alive and well and living in Florida! He hasn't been around much because of his FAI team commitment and his new baby boy! Look for a new twin-engine plane from Ray in the near future. The same goes for Bob Fiorenze—no, not a new baby; a new airplane. Look for Fio to return to the Masters and possibly Top Gun for '91.

Dennis Crooks is in the same boat. Now that he has the Yellow Aircraft F-14 project put to bed, he's rockin' and rollin' with his new Top Gun entry for next year. Speaking of Yellow Aircraft, I understand that they're finally shipping Spitfire, Zero and P-47 kits.



For a basically all-aluminum airplane, Charlie Chambers' P-51D from the Platt kit has a great color scheme: black-and-white checkerboard with red trim, O.D. anti-glare panel, red markings and black squadron codes.

WARBIRDIES

The Spirits of St. Louis R/C Flying Club (whew, did you guys ever think of shortening your handle?) has been promoting a special competition class that deserves some recognition. They call it Warbirds Unlimited, and it promotes scale warplane racing. There's a specific set of rules and a wing area/displacement requirement for scratch-built and kit airplanes. It looks like loads of fun, and I'm trying to figure a way to attend the event in September. So far, the wood kit House of Balsa

40-size P-51 Mustang now also produced in fiberglass by Paul's Flying Stuff* has been the airplane to beat, but I'm figuring a downsized version of my Tony might catch up. Remember, these birds are static-judged first and then raced, and their total score is a combination of both. If you'd like a copy of the rules, just mail a self-addressed, stamped envelope to Jim Sprouse*. I promise you one thing; it's gonna be a hot contest!

So much for this month, you maniacs. Just a few reminders before I go: never use a 1/4-inch spruce dowel as a starter probe for your new ducted fan. When you see the words "CG goes here" on your kit plans, it does *not* mean that you cut out that little black-and-white symbol and paste it to the side of your freshly painted fuselage. See you soon, and don't forget to check that six!

**Here are the addresses that are pertinent to this article:*

John Peck Leisure Products, *131 Ravenwood Rd., Versailles, KY 40383.*

Zenoah; *distributed by World Engines, 8960 Rossash Ave., Cincinnati, OH 45236.*

Davis Diesel, *P.O. Box 141, Milford, CT 06460.*

Hangar One, *1402 Madison Ave., Montgomery, AL 36107.*

Robart Manufacturing, *310 N 5th St., St. Charles, IL 60174.*

Bob Violett Models, *1373 Citrus Rd., Winter Spring, FL 32708.*

Paul's Flying Stuff, *P.O. Box 121, Escondido, CA 92025.*

Jim Sprouse, *1193 Gist Rd., Bridgeton, MO 63044.* ■

FIFTY YEARS AGO

(Continued from page 14)

phone. It was difficult to make the model land itself, because once it lost power, weight threw off the wave frequencies. It's interesting that the engineers who worked with this model were also experimenting with an auto-landing system for full-size craft—and having similar problems!

NATIONALS ON PARADE

R/C modelers' innovations were displayed at the '40 Nationals. Ed Lidgard's ornithopter (a flapping-wing plane) stayed up for approximately 2 1/2 minutes to break the world's record, and Chicago's R. Jagiello recorded a 19.3-minute flight—a new Jr. record. Bill and Walter Good put on a tremendous stunt show with their gas job, even though someone had stolen their transmitter the night before. The Buzzard Club of Chicago made a mass flight of 15 identical models; member J. Konefes' plane stayed aloft for over 49 minutes! What about the models that weren't quite as well-engineered? Some delighted the crowds with spectacular crashes; 4-foot marsh grass at the end of the runways saved others. After the competition, modelers—like full-scale plane engineers—headed back to the drawing board to come up with what, they hoped, would be the next flying wonder. ■

BASICS OF R/C

(Continued from page 32)

To install the sheaths (one on each side of the fuselage), drill two, 1/4-inch holes side by side at the exit locations on each side of the fuselage. Trim away the wood between the two holes, and use rolled sandpaper to shape the fore and aft edges to allow the sheath to point toward the cabin area and toward the control horn. Cut each sheath so that it's 4 inches longer than the distance between the servo location and the exit hole. Use sandpaper to roughen the outside of each sheath a couple of inches from both ends, and slip them through the exit holes up toward the cabin. Allow 2 inches to extend outside of the fuselage side. Fill the exit holes with a mixture of epoxy and microballoons (or with some other filler), and gently twist each sheath back and forth until it's completely surrounded by the epoxy and the hole is filled. After the epoxy has set, trim the sheaths so that they're flush with the fuselage sides, and

(Continued on page 66)

QUIET FLIGHT

Trays, folders and a lot of imports

by JOHN LUPPERGER

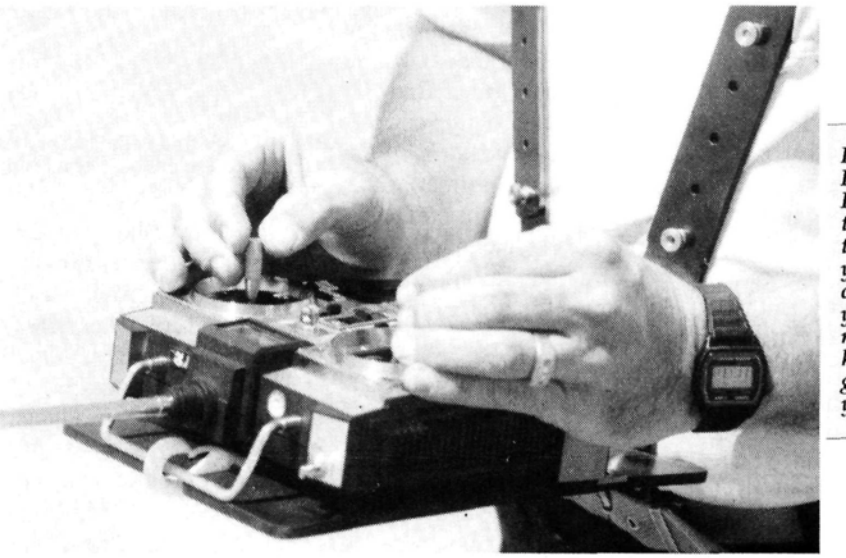
SOME MONTHS, I have so much to tell you that I have to decide what to leave out until another time. Well, this month is "another time," so I'm now trying to catch up on "old business" and some new product releases.

COLOR VISION SUNGLASSES

I've already mentioned JS&A's* great flying glasses—BluBlockers—and this company has done it again! Color Vision sunglasses enhance certain colors—primarily red, yellow and blue. Although their lenses have a greenish smoked tint, they give a slightly reddish cast to light colors. I've found that a yellow, orange, or red plane stands out against a blue sky as though in a focused bright light, so these glasses are great for aero-modelers. Other modelers have tried mine and can hardly wait to get their own.

Like all JS&A's sunglasses, Color Visions block out 100 percent of harmful UV light. Their light, stylish glasses also make it very easy to see cars' brake lights in bright sunshine, so they're perfect for driving.

For more information, write or telephone JS&A. If you've ever tried their BluBlockers, you know that a good pair of shades can greatly enhance your flying and protect your eyes.



L.A.W. Racing Products' transmitter tray allows you to concentrate on your flying, not on keeping a grip on your radio!

The tray's straps rest comfortably on your shoulders, but they don't interfere with your radio operation.

PHOTOS BY JOHN LUPPERGER

RADIO TRANSMITTER TRAY

For years, American modelers have been beaten by Europeans in international competitions. What gives them the edge? They use radio transmitter trays, which allow them to hold their transmitter sticks gently between thumb and finger for more control and a better "feel" for neutral.

Most of the trays available in the U.S. were designed for European-style radios. On most European transmitters, the switches and pots are on the radio face, so when one of our radios is put into this type of tray, some of its switches are concealed.

Through careful design and engineering, the L.A.W. Racing Products* transmitter tray eliminates these problems. It was designed to allow access to the radio face, top and sides. Its Komatex base plate is made of a closed-cell, rigid PVC that's quite strong and doesn't conduct or generate static electricity. (This could cause problems with the new computer radios.) The radio is held securely by a spring, a clip and two machined clamps. The tray's straps and frame are machined of 6063-T52 aluminum and anodized in red. The adjustable straps fit comfortably over your shoulders.

I've used the tray for a couple of months, and I'm pleased with it. At first, I felt awkward and had to get used to it, but now I have a lighter touch on the sticks, and this means more precise control of my model. If you're into competing, or just want to get a little more

QUIET FLIGHT

positive "control," this tray would be a good investment. Write or call L.A.W. Racing Products.

BOLLY FOLDING PROP

If you aren't a devotee of glow-powered pylon racing, you've probably never heard of Bolly Props*. They're made in Australia and are available in the U.S. from Tom Dixon. Bolly has a reputation for making high-quality efficient props.

The 13x7 folding props are available in fiberglass or carbon fiber. I have a set of beautiful fiberglass ones, which were balanced when I bought them and needed no finishing. They're quite thin, and you can easily see the glass fibers running along the length of the blades. I used them on my geared Astro, six-turn FAI in an Astro Viking, which a friend flew at the Astro Champs. Other sizes are available, but you should contact Tom for more information.

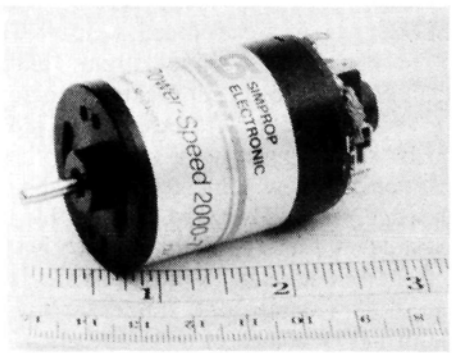
SCALE SAILPLANES

Archaeopteryx Avion Associates* (I'm glad this isn't an oral report!) has one of the largest selections of scale glider plans, three-views and kits. It offers more than 50 plans (primarily vintage) in 1/5, 1/4 and 1/3 scale, and glass fuselages are available for several of the designs. There are also more than 1,000 three-views and 25 color-documen tation packs. Kits are available for the 1/4-scale Tandem Tutor, the 1/5-scale Grunau Baby II, the 1/4-scale Zogling and the 1/3-scale Woodstock. With the new scale format at the Nats (in which the emphasis will be on scale judging and not flight duration), it might be time for you to look at one of these fine models. Proprietor Jim Ealy also sells Rip-Stop parachutes and four strengths of high-start.

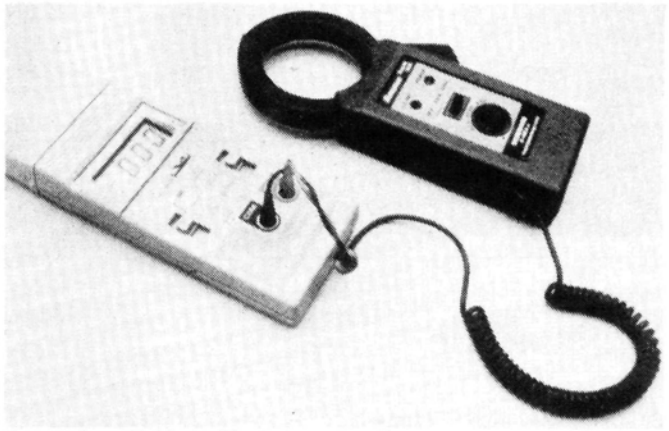
BEEMER R/C WEST

If you haven't heard of Beemer R/C West*, you probably aren't alone, but you *have* missed some great goodies. Bob Beemer runs his company quietly, and most people hear about it from a friend, who heard about it from another friend....

Beemer imports from several European manufacturers, including Multiplex and CHK Modelle. The gliders from both include some high-performance ships that usually have glass fuselages and pre-sheeted wings. Beemer is also the exclusive distributor of the Multiplex Royal radio systems—the top-grade, soft-module and computer radios that are now so popular in Europe. If you're interested in performance products, contact Bob to ask for a catalogue and promotional material.



Simprop's new ferrite-magnet motor from Simprop is available from Hobby Lobby International. Motor is supposedly capable of a 266-watt output on 7 cells. Most hot cobalt 05s put out 200 to 220 watts!



CAMD from Hobby Lobby International can measure up to 400 amps. Unit simply clamps over wire where you want to take a measurement.

HOBBY LOBBY INTERNATIONAL

I really like Hobby Lobby's* Oracover film covering material, and I'm delighted that some recently introduced colors bring the total to 30. The additions include four transparent ones, four metallics and two fluorescents. If you haven't tried Oracover yet, get some—you'll love it! It's the best material I've ever used on sheet surfaces.

Hobby Lobby is the leading importer of electric and sailplane products from Europe. Its new catalogue (no. 16) includes a slew of new products that will blow your socks off! I won't go into details (that's what the catalogue is for), but I thought I'd whet your appetite with some highlights.

Hobby Lobby's new Power Speed 2000-7 motor is a ferrite-magnet, 540-size unit that's supposedly capable of an output of 266 watts! If this claim is true, I'll have one soon.

Another new product is the Graupner CAMD (Clamping Amp-Measuring Device). Along with a digital multimeter, this unit enables you to measure current draw up to 400 amps without disconnecting any wires. Clamp it onto the wire you want to measure, and your multimeter will display the voltage in increments of .001 volt. Each amp is shown as .001 volt, and accuracy is within ± .2 percent. This will certainly help you find the right timing, wiring, connectors, or props for your next electric project. There are several other new planes in Hobby Lobby's new catalogue, but I'll save them for another month. Remember to tell them you read about it in *MAN*.

MTB AIRFOIL PROFILE BOOKS

The MTB airfoil profile books from Germany haven't been available since Wilshire Hobbies closed early last year. The books discuss all types of airfoils and include graphs and full-size drawings. The text is in German, but most of the information is in the graphs and the profile drawings.

(Continued on page 79)

BASICS OF R/C

(Continued from page 60)

sand to a smooth finish.

Hold the cabin ends of the sheaths in place, and note the position of both sheaths at approximately 6-inch intervals from the tail to the cabin. Make bulkheads to fit these areas, and drill 1/4-inch holes in them to secure the sheaths along their lengths. Slip these bulkheads onto the sheaths, and epoxy them to the sheaths and to the fuselage sides.

Make one more bulkhead for the cabin area, about 3 inches behind the servos. Once more, drill 1/4-inch holes in the bulkhead that will match each sheath to the proper servo, and epoxy as before.

Final control hook-up is simple: slide the pushrods through the sheaths, cut them to length, and once the airplane is finished, attach the clevises to each end. That's why these systems are so popular. ■

WARBIRD RACING

(Continued from page 47)

Others choose a lighter, less detailed plane with a lot of horsepower, and they sacrifice some static points for all-out speed. Still others go for the middle of the road—an average static score and an average speed. All of the approaches have done well; only two of the six events held so far have been won by the fastest airplane.

THIS COMPETITION

When the static judging was over, several fliers had scores in the 90s. Michelle Boland took high static score with her Super Corsair built from a Royal kit. Ken Thornton of K Bees Models was second with one of his pre-built, but finely detailed, foam Spitfires; and Larry Cranton was third with his .40-powered P-51

(Continued on page 74)

The Tsunami is about as small as it can be to house electric components and still maintain an acceptable wing loading for sport flying.

UNITED MODEL DISTRIBUTORS

electric TSUNAMI

by JOHN LUPPERGER

UNION MODELS* offers a line of small schoolyard electrics that all use the same type of construction and basic power plant. There are over a dozen enjoyable models in the series, and United Model Distributors currently distributes four. (I hope they'll consider importing others from Japan.) I've owned a Challenger, a

This light, foam, electric-powered racer is modeled after the big Unlimited

PHOTOS BY JOHN LUPPERGER

The Tsunami handles well and grooves nicely for such a small model. With the recommended throws, it's mildly aerobatic and can perform loops, rolls and inverted flight. Elevator throw could be increased to help landing flare.

SPECIFICATIONS

Type: *Electric-powered, sport-scale Reno racer*
Wingspan: *30.7 inches*
Weight: *19 to 21 ounces*
Wing Area: *162.7 square inches*
Wing Loading: *17.2 ounces per square foot*
Power Req'd: *Reno F-1 Gold motor (supplied); 7.2V, 500mAh battery pack (supplied)*
No. of Channels Req'd: *2 minimum (aileron/elevator/optional rudder)*
Suggested Retail Price: *$239.99*
Features: *All-foam fabrication, pre-finished. Injection-molded plastic parts are provided where required. Motor, quick-charger and battery pack are all included in the kit.*
Comments: *Although it's small, this kit delivers excellent performance. Flights only last about 3 minutes, but this seems to be a fair compromise, given the plane's aerobatic capabilities.*

Champion and a Rocky—all rudder/elevator-controlled models—and each had flight characteristics that made it perfect for a specific skill level. The Tsunami is the most advanced in the series, and with aileron control, it's also the most aerobatic.

The full-scale Reno racer, on which the beautiful Tsunami is based, was the idea of John Sandberg (who provided funding), and it was designed by three Lockheed engineers. It has been making waves (no pun intended!) in full-scale racing aviation ever since its introduction. The model Tsunami is just as exciting—only smaller.

Although the all-foam model has a toy-like quality, it's pure R/C. It can be set up for full-house operation to make it completely aerobatic, and its exceptional lightness makes it relatively quick. Whenever it's flown, modelers make comments like, "I had no idea that a small plane would fly so well," or "What does that little baby have in it?" They're surprised to find out how light it is and that it runs on only a geared 280-type motor and a 6-cell 500mAh battery pack. This model is as much fun to show off as it is to fly!

WHAT'S A TIDAL WAVE DOING IN THE DESERT?

Throughout this issue, you'll find references to the Unlimited class of Reno racer. You might conclude that the term "Unlimited" is synonymous with Warbird, but that's not exactly true. While most of this exclusive breed of racing machine are ex-military, "Unlimited" might just refer to the level of resources required to produce and maintain these thoroughbreds—especially in the case of Tsunami, which, when it appeared in 1983, was the first home-built Unlimited racer in over 40 years!

Frequently misidentified as a modified P-51, the Tsunami (Japanese for tidal wave) actually has very few Mustang parts. Unless you include the Rolls Royce Merlin V-12 and its mount, only the tail-wheel mechanics and some other bits and pieces trace their origin to the '51.

If you think the Mustang was slippery, consider that the Tsunami has 20 percent less frontal area and a wing that's 40 percent smaller! Couple this with the fact that its Merlin cranks out about 3600hp, and you can understand how it flies at 470+ mph! If scale Unlimited R/C pylon racing ever becomes a reality, I know what I'll build!

by RICH URAVITCH

The full-scale Tsunami was specially designed to be the fastest Unlimited racer around.

PHOTO BY DICK TRISTAO

The kit includes everything except a radio.

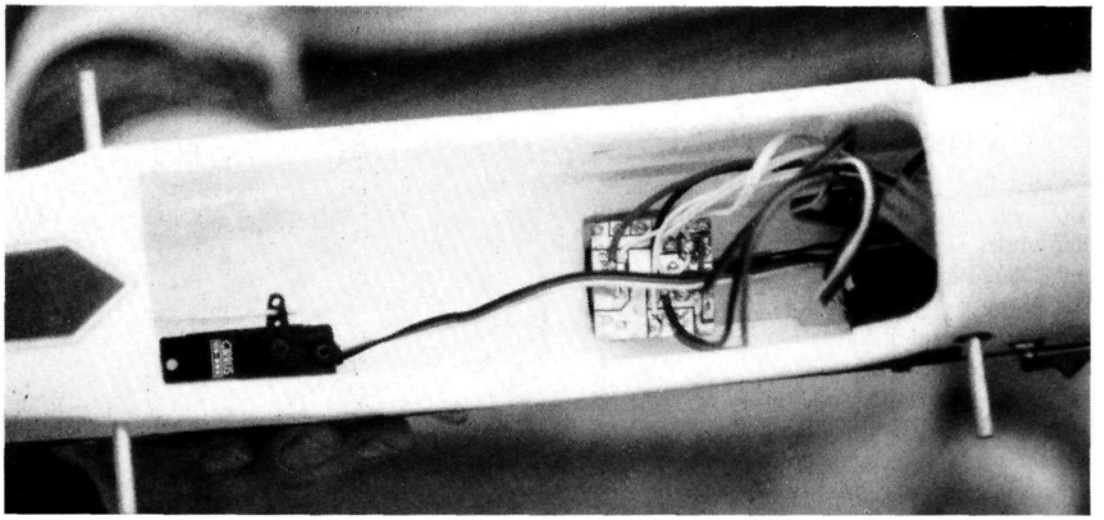
TSUNAMI

THE KIT

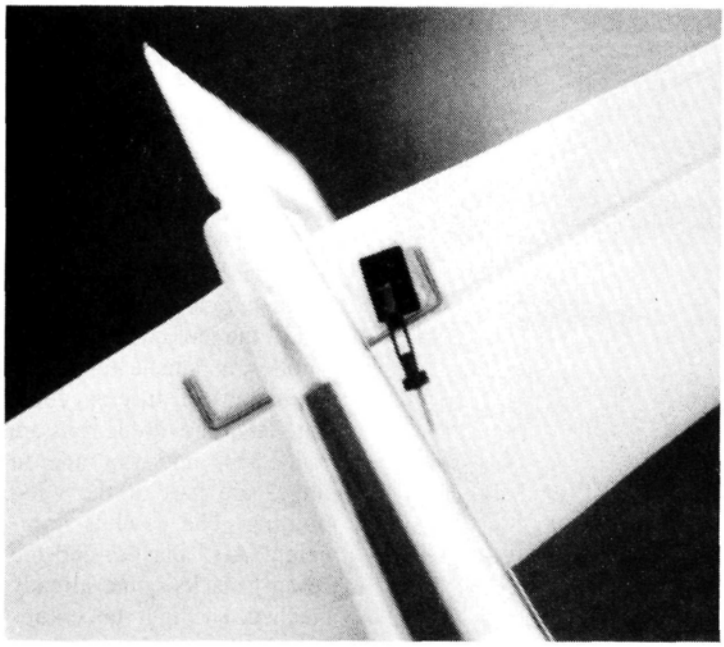
The parts are carefully wrapped in plastic sheet and protected by cardboard dividers or small boxes. This is the most complete R/C kit you'll ever buy. It includes: foam model components; all hardware; Mylar transfers; a geared motor unit; tools; a battery pack; an auto-cutoff BEC unit; a charger; a spare prop; and a spare drive gear with output shaft. Also included are a mini Phillips screwdriver, sandpaper and a small wrench for the prop nut. The only things you'll need to complete the model are epoxy and a radio.

The model's main components are made of different types of polystyrene foam. The fuselage is white foam of the type you see in most expanded-foam kits. The wing and tail material is more like the packaging at fast-food restaurants—a fine-cell foam that's very light, yet very strong. The tail surfaces are of solid foam, and the hinges are designed as part of the molding. The wing is hollow and made up of three laminations of different foam materials. The torque rods are molded-in, and the aileron hinges are part of the wing molding. The cowl is lightweight ABS plastic, and the exhaust stacks come already attached. The light rubber tires and wheels are mounted on the landing gear, which is attached to pre-formed foam landing-gear blocks. All the hardware comes on two injection-molded plastic "trees."

The flight system consists of a Reno F-1 Gold motor, a Sanyo 7.2V, 500mAh battery pack and a mechanical timer/charger. The Reno F-1 Gold is a modular type-280 motor in an unusual gear-drive unit. The



Because the flight batteries are in the wing, there's plenty of room in the fuselage for radio gear. If you didn't know how small the plane was, you'd think this was a shot of a .40-size model.



Rather than having a pin that goes through the horn, the clevis snaps into it. It unsnaps easily, but holds firmly.

motor sits backwards (with the brushes toward the model's front and the gears against the firewall), and the drive shaft comes forward over the top of the unit. This puts the brushes in front where they can receive cooling air directly from the prop. You can charge the 7.2V Sanyo battery pack with the supplied mechanical timer/charger. There's no way to tell the batteries' state of charge, and the manufacturer warns that, to ensure consistent motor-run times, they must be fully discharged before being recharged. The large spinner and props (you receive two) are hard plastic.

BUILDING

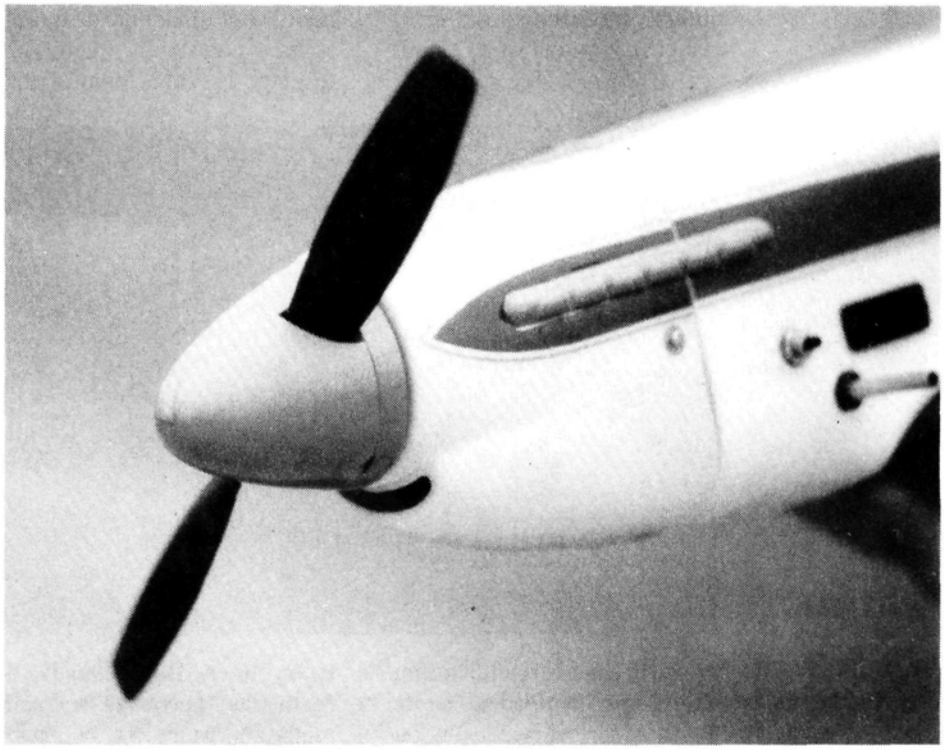
Because the Tsunami is an ARF and involves less work than most, I won't go into much detail about building it. The 28-page instruction book contains all the information you need to finish the model. The first page shows all the parts (in clear line drawings) and the tools needed for construction. Page two discusses motor and battery break-in, as well as the various radio setups that will work in the Tsunami. I broke-in the motor by running it for a few hours at 1.5V on a Tekin* Motor Analyzer, and I cycled the batteries several times on a Taylor Power Pacer.

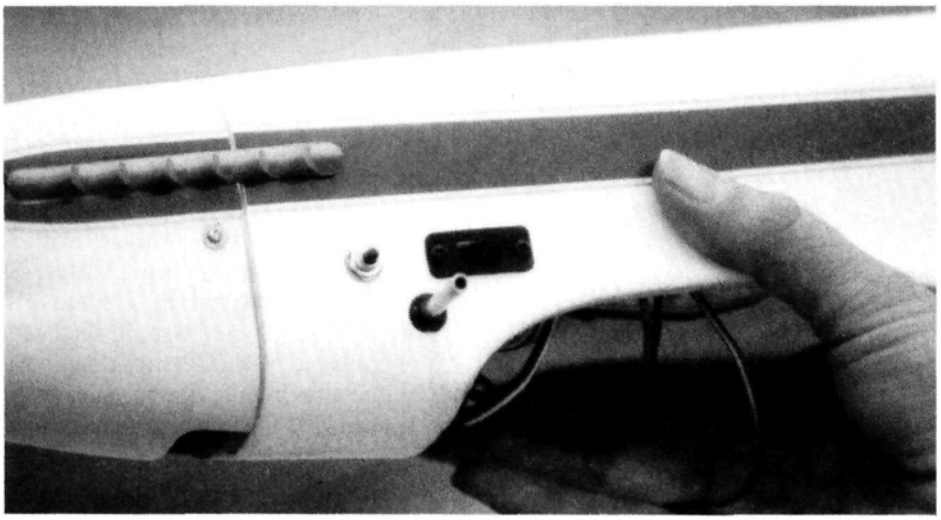
Glue the plastic tube reinforcements into holes in the fuselage sides, and insert the aluminum, rubber-band hold-down tubes. Epoxy the tail skid into a slot in the rear of the fuselage, screw the gear-drive motor unit onto the firewall, and attach the cowl with two screws.

Glue two foam blocks into the wheel wells in the wing, which contain the gear hold-down snaps. Install the flight battery case in the opening in the center of the wing, screw the plastic ends of the aileron horns into place and apply the Mylar transfers. Now snap the landing gear into place, and take some stiffness out of the aileron hinges by flexing them back and forth.

Mount the horn on the elevator, and epoxy the wire joiner into place. Flex the hinges by hand to loosen them up, and slide the elevator unit through a slot in the fuselage

The large, scale spinner adds to the looks of the finished model.





Motor-arming switch is in front of the radio switch. Motor is started by pushing switch, and it shuts down when the BEC unit senses a voltage drop.

and glue it into position. I decided to set-up the Tsunami with just two channels, so I only had to glue the rudder—in its fixed position—into the fuselage slot.

RADIO INSTALLATION

I used a Cirrus 5 PCM and two S-233 servos. The supplied auto-cutoff BEC unit eliminated the need for an airborne battery pack and helped reduce weight. This unit is an "on"-only type that's not radio-controlled. When you launch, hit the arming switch; this starts the motor, which will run until there's a voltage drop that trips the unit and shuts it off. I mounted the servos with servo tape, and all the other equipment (including the flight battery) with Velcro.

PERFORMANCE

This is the enjoyable part! As soon as I took the Tsunami out of the car, people started to gather around. It's amazing how much attention this diminutive model gets! I had charged the batteries at home, so I was ready for the first flight. Radio on...range and control check...hit the arming switch, and away it went! Because it's so light, I had no problem hand-launching this low-wing model. Simply hold it behind the wing and give it a gentle push; there's enough power for the Tsunami to get away smartly.

I flew the Tsunami around to get a feel for it. Its climb rate is good; it could easily fly out of sight if you allow it to climb for the entire motor run. Everything seemed right, and the recommended surface throws felt good. I tried a power-on stall, and the model rolled gently to the left, recovered quickly, and continued to fly.

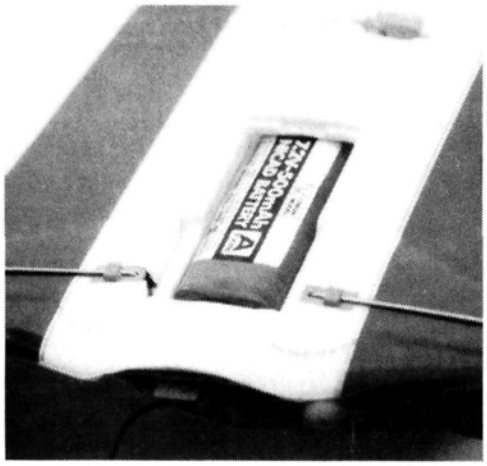
When the motor quit, the model headed to earth in a hurry! To maintan control, it was necessary to keep up the air speed. As the model was just about to touch down, I flared, but nothing happened. The model simply ran out of elevator in the glide and then landed. Luckily, it's so light that there was no damage. Subsequent flights with different landing-approach styles all resulted in the same type of "no-elevator-left" arrival. Because the positions of the heavy components (e.g., the motor and battery pack) are fixed, the model tends to be nose-heavy, so a little more elevator throw might be required for landing flare.

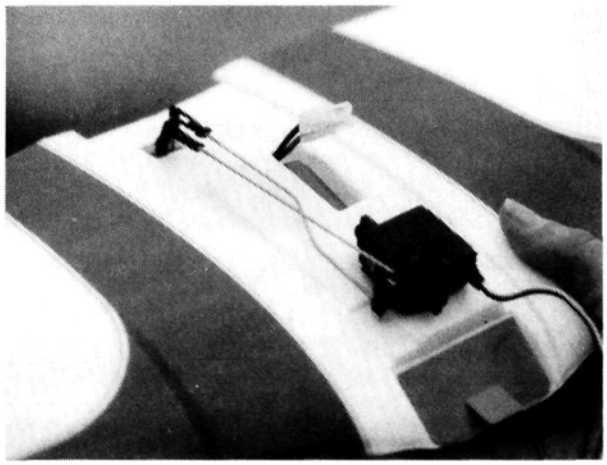
For the next few flights, I used my Tekin and Novak* peak chargers for charging, and I timed the motor runs. The model consistently stayed up for about 3 minutes, and with a model this small, that's plenty of time on the sticks.

(Continued on page 84)

Right: Landing gear simply snaps into the pre-installed gear blocks. Battery is housed in a plastic case and protected by a louvered lid.

Far right: Aileron servo is taped to wing's surface. Battery connector can be seen protruding through hole in wing.





WARBIRD RACING

(Continued from page 66)

Candyman made from a wooden House of Balsa kit.

Michelle Boland's Super Corsair was one of the most interesting and impressive entries. It was powered by an Enya 1.20R, and at 8½ pounds, with wheels retracted, it had to be the fastest 4-stroke plane ever entered. Jim De Veuve's beautiful silver XP-40 also finished very well. Powered by a .60 2-stroke engine, it must have been quite light because it handled well. It's always nice to see unique aircraft like this one.

The fastest airplane was probably Larry Cranton's Candyman P-51. With its high static score, Clarence Lee Custom K&B 6.5 engine and Macs 7.5 tuned pipe, it was a very powerful entry. The light wooden airframe was beautifully covered and trimmed in MonoKote. Had it not been for cuts in three of the seven rounds of racing, Larry surely would have been right at the top.

There were several other unusual entries, including the .60-powered Spitfire of Ken Meyers from Southern California, and Clay Bateman's chrome MonoKote-covered P-47. By far the most popular planes were P-51s and Spitfires. The P-51s came in all sizes and types, while most of the Spitfires were ARF foam versions from K Bees Models. There were even a couple of EZ P-51s and an EZ Zero. If documented and flown well, all these planes can be competitive.

AND THE WINNER IS...

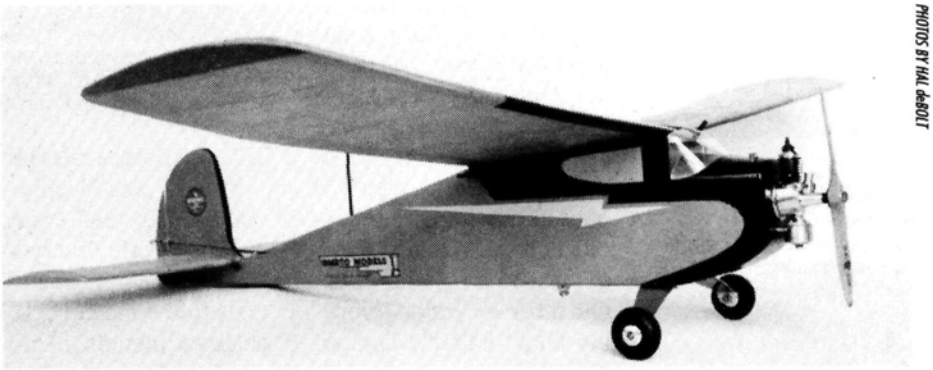
After the last heat, the scores were tallied to determine the final standings. For the first time, a special award—donated by the McDonnell Douglas Corporation—was given to the pilot with the highest total racing score, but there was a tie be-

(Continued on page 78)

GOLDEN AGE
OF RADIO CONTROL

by HAL deBOLT

Early "Small-Steppers" and Min-X radios



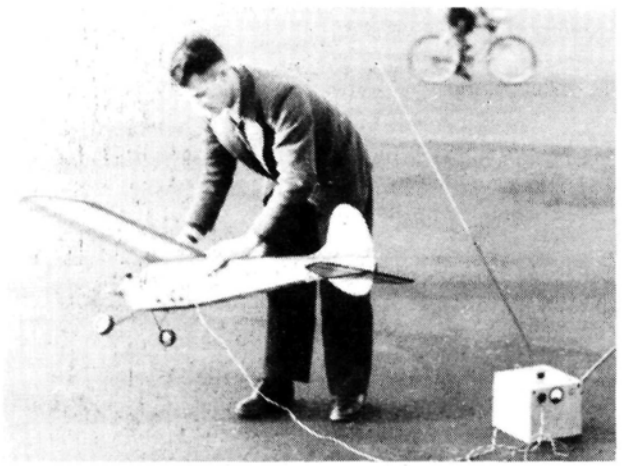
PHOTOS BY HAL deBOLT

Probably the first kitted R/C mini-plane, the Live Wire . Anderson-.049-powered Kitten was a sprightly flier at 1½ pounds. It showed what could be done with R/C and small planes.

ALL READERS OF *MAN* must know about Randy Randolph and Joe Wagner and their penchant for small R/Cs. "Small steppers" have been around for years, as is shown by the following notes gleaned from the December '68 KCRC "Contacts" newsletter:

For show-and-tell, Charlie Reed brought an original miniplane with the new E-K mini-system, which was approximately the size of a modern system, but was marvelled at in those days. Bud Atkinson showed a Kraft Flea Fli, Bob Hartley had a Ken Willard Top Dog, and plans for other small planes were offered. Remember these names? New Era I, Sky Mite, XF226 and La Petite. In the case of small R/C models, the saying "There's nothing new under the sun" might be true: they were a real fad in 1968!

From the same issue of "Contacts," here are a few items from the classified ads: Herb Hines offers a complete Bonner 8 propo system, two planes, a Veco .45 and an O.S. .49—all for $150!; Hubert Speer offers a Kraft 4 propo for $200; Bob Garnett has a complete Lanier Comet with a C-K Log 5 and Merco .61 that can be yours for $300; and Charlie Reed would let you have his new K&B .45 for just $10! How times have changed! The KCRC runs parts of old newsletters in current editions. Since these sections are of interest to old-timers and newcomers, perhaps other editors should consider it? *(Editor's note: —kind of like this column or "Fifty Years Ago"?)*

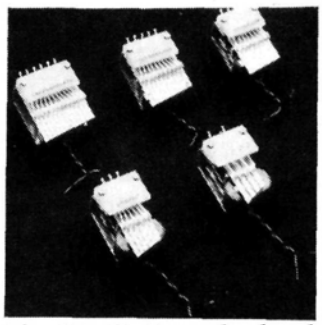


This Junior 60 by Bill Prow of Great Britain is typical of antique OT R/C.

MORE ON MIN-X

The last time I wrote about Min-X, the information came from former owner, Jim Northmore, who, when he left the company, went into another business, prospered and still flies R/C. We followed Min-X from its early single-channel system to its strong entry into reeds, which it covered very thoroughly. I'll continue the Min-X story.

The company produced its own own reed-bank discriminators, and some of its innovations are noteworthy. One press release said that Min-X used ceramic magnets that wouldn't deteriorate with constant magnetic fluxing. The reeds were of the finest, rust-resistant Swedish steel. The reed contacts seemed to be like Bramco's silver-wire type, but they had adjustment screws in the nylon contact holder. Min-X was obviously on the leading edge of reed-bank design.



The Min-X Corp. developed reed-bank discriminators that were on the leading edge of that technology.

Min-X also offered the ability to start with a basic system and add channels as desired. Reed transmitters needed tunable circuits to make the audio tones that caused the reed-bank

GOLDEN AGE

switches to vibrate—two for each control. The tuned circuits were usually integral to transmitter circuitry, but the Min-X system was different: the tunable circuits were separate and removable. In effect, with one basic transmitter, you could "plug in" as many channels as you wanted—up to 12 channels.

The Min-X proportional system in prototype form. Note the brick-style servo packaging. Developed by Jack Lemon and Bill Bertrand, it was never produced.

The Min-X brand was the only one with a two-component receiver system. The first case contained the RF and tone amplifier, and a second, cable-connected section contained the reed bank and associated relays. With that in mind, perhaps you can see how you could buy a relatively inexpensive 4-channel (two controls), and later, when you needed or could afford it, you had only to buy another tuned-circuit module for the transmitter and a matching second receiver section (probably about half the components that would be involved in a completely new system). The rapid progress of those early days often made it necessary to discard a considerable R/C investment when you needed an upgrade. Keeping costs down for R/Cers, Min-X claimed its systems never became outdated! This was quite a sales pitch!

Jim McCurdy's recently completed Live Wire P-51—made from a cherished 25-year-old kit! With an O.S. 40, it's a "sweet flier." Jim's daughter Tammy-Lynn and the family terrier, Milo, stand by.

Min-X was deeply involved with reed systems, dealing with everything from simple 4-channel systems to the mega-buck 12-channel models. Activity continued into the "relayless" era, at which time the company said its basic Min-X receiver was well suited to the Bonner Transmite servos.

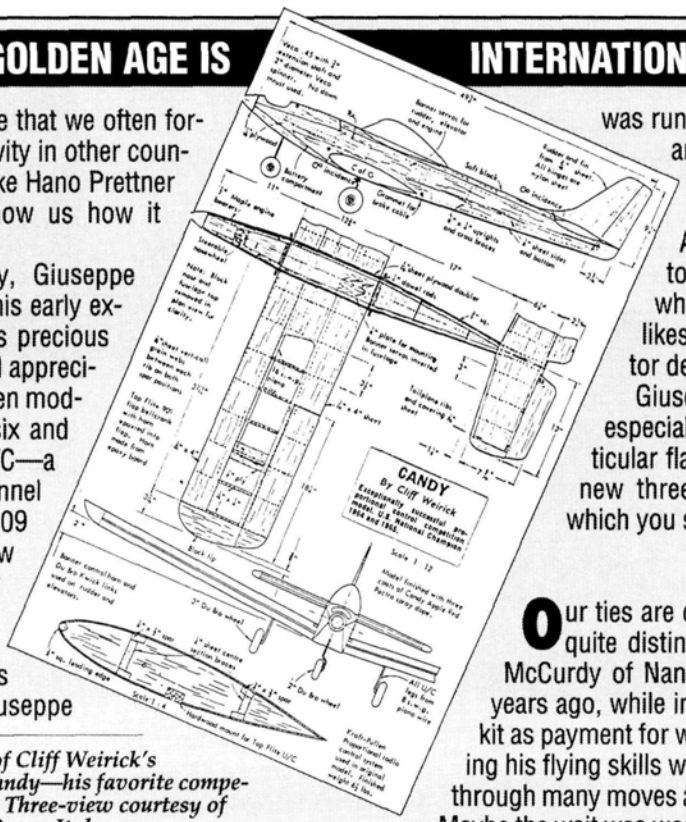
The viability of the Min-X system apparently ended when reeds were replaced by digital proportional. Remember that when propo systems became practical, sales of reeds plummeted overnight, and there's evidence that Bill Bertrand was developing a multi-proportional system and had it flying in the prototype stage.

Apparently, Min-X decided that its trusty Champ wasn't suitable for testing full-house proportional, and Bill designed a very modern-looking pattern style, which he called the "Valkyrie." Its style was so revolutionary that if you saw it, I'm sure you'd think it was a '90s design. A "Flying

THE GOLDEN AGE IS INTERNATIONAL

The USA is so large that we often forget about the activity in other countries—until people like Hano Prettner come along and show us how it should be done!

From Rome, Italy, Giuseppe Fascione tells us of his early experiences and shares precious material I know you'll appreciate. Giuseppe has been modeling since he was six and had his first R/C—a Graupner single-channel powered by an S.T. .09 diesel—in 1960. How many of you know that Garofoli's first Super Tigres were diesels of various sizes? By 1966, Giuseppe was running full-bore with a Weirick PCS system and an S.T. .60-powered Doug Spreng Twister and enjoying Phil Kraft's Bar Fli.



Excellent three-views of Cliff Weirick's National Champion Candy—his favorite competition design ('60s era). Three-view courtesy of Giuseppe Fascione of Rome, Italy.

He then earned his masters degree in Aero Engineering, started a family and was too busy for modeling until five years ago, when he again found time for it. He says he likes the structural concept that my Interceptor design established.

Giuseppe looks forward to each issue of *MAN*, especially this column, which he says has a "particular flavor" for him. He has contributed several new three-views of Championship R/Cs, one of which you see here.

CANADA CALLING

Our ties are close, but Canada is a sovereign country, quite distinct from the U.S., so the letter from Jim McCurdy of Nanaimo, B.C., can be included here. Many years ago, while in Toronto, Jim accepted a Live Wire P-51 kit as payment for work he had done for a hobby shop. Thinking his flying skills weren't up to the P-51, he hung onto the kit through many moves and offers to buy it, and he recently built it. Maybe the wait was worthwhile: he says his O.S. 40FSR-powered

Models" R/C column of that time showed the plane and its propo system, and it's interesting to see that the single-stick transmitter had a *left-hand* configuration and the airborne system was *brick style,* with the servos in one unit. There's no evidence that the proportional system was ever produced.

I hope I've filled in some blanks and sparked a few memories, and if you have anything to add, let's hear it!

OLD-TIME DOCUMENTATION

If you're an enthusiastic participant in the Vintage R/C Society and are looking for an antique design (before 1980), you've probably found a number of free-flight types, mostly lacking the "real plane" look that definitely represents that era. If your plane must have "looks," however, I strongly suggest that you review Bill Winter and Co.'s excellent documentation for the "R/C Special" presented in the March and April issues of this year's "Model Aviation." You'll find a lot of information on this modern-looking R/C from that antique era, and it might be exactly what you've been looking for.

No more old-time till next time...! ■

Typical Min-X ad of the '50s offered systems from single-channel all the way to 12-channel, and its equipment was the most versatile brand. (See text.)

P-51 is "one sweet flying plane." He has a vintage era R/C that astonishes many at the flying field. The P-51 was a companion kit to the very popular Live Wire Cobra, and in racing trim, the P-51 was a National Champ in Formula II pylon. As some of you have noted, many of these vintage designs are more than a match for today's equipment.

WAITING IN GERMANY

Did you ever wonder what an airline captain does while you sit and wait for mechanics to get *all* the engines working? While Captain Lionel Mills of Royston, Herts., England was waiting for his airplane to be repaired in Kol-Porz, Germany, he read the October '89 issue of *MAN,* and he even had time to write to me. (Bet the passengers didn't appreciate the wait as much as he did!)

Capt. Mills says he has been enthusiastic about OT R/C for more than seven years and that he flies a Rudder Bug and a Kiel Kraft Scorpion.

His letter refers to several R/C designs that we found in some old "American Modeler" magazines; one was Don McGovern's Monster flying boat. Capt. Mills bought the Monster drawings in Canada back in the '50s, recently decided to build it and had just bought the balsa. He hopes that someone who has the old mag will copy the article that went with the plans, because he needs more information. How about it, old-time R/Cers? Can you answer this pilot's mayday call?—to further the cause of international relations!

WARBIRD RACING

(Continued from page 74)

tween Dennis Roeper and Darrin Frost. What's the best way to find out who is the best racer?—hold a flyoff, of course, and what a flyoff is was!

The two racers crossed the start line a few feet apart and right behind the pace plane. They exchanged the lead several times in the first three-quarters of the race, but then something happened. The engine in Dennis's P-51 started to go sour, and this gave the win to Darrin with his K Bees Models P-40. This was one of the event's best races, and a fitting way to decide who was the weekend's best racer.

Dennis wasn't too disappointed about not winning the flyoff, because his good static score helped him win 1st place overall. Glen Heithold was 2nd with his O.S. .50-powered Kawasaki Hein; Michelle Boland took 3rd; and 4th place went to Darrin Frost, who used his consistent, fast flying to make up for a low static score. Rounding out the top five was Jim De Veuve, who had a good all-around score with his XP-40.

With the largest number of entries yet and well over 1,000 spectators, the competition was a tremendous success. It's

likely to continue this steady growth and be a major event in the future. The contest went off with almost no problems, and its great success is a tribute to the hard work of CD Bob Smith and his entire crew. The next Warbird Mini Reno Races will be held on September 7 and 8 of 1990, and they should be even better, so don't miss out. See you there! ■

QUIET FLIGHT

(Continued from page 62)

They're available now from J.M. Lupperger Plans*. There are five books: two on Eppler profiles, one on NACA profiles, one on Quabeck profiles and one on Wortmann, Benedek, Issacson, Pfenninger, etc. Lupperger Plans will also distribute FMT (Flugund Modelltechnik) plans here in the U.S. The FMT plans cover a wide range of electrics, thermal gliders, slopers and many scale sailplanes. Write for a catalogue and pricing information.

Till next time—good thermals and a full charge!

**Here are the addresses of the companies mentioned in this article:*

(Continued on page 84)

Our author salvaged his Air Scout by adding a Rogallo Wing. This easy-to-control, flex-wing airplane flies, climbs and dives at about the same speed!

ROGALLO WING

by STEVE STAPLES

AREN'T BUILDING and flying model airplanes supposed to be fun? I think so, and like so many modelers in Little Rock, AR, I enjoy showing up at the flying field with extraordinary flying machines. The flex-wing—or Rogallo wing—has been around since the '40s and was one of the first wing designs used on modern hang gliders. Hanging a model airplane under one of these wings isn't really a new concept, but it *is* fun.

Overhead, the Rogallo Wing-equipped Air Scout looks like a different airplane. It's a photographers dream though, because it flies so slowly!

WINGING IT

With a main wing structure of only three spars and a brace, the Rogallo wing is an easy project. I volunteered my old Ace Air Scout, with its O.S. .20 and 3-channel radio, as the main sled. First, I built a base and pylon mount from 1/4-inch scrap plywood, although 3/8 inch would have been better. I built the mount to fit the Air Scout's wing saddle, so I didn't have to modify the the plane, and I can change wings in a few minutes.

Touchdowns are about as light as they'll ever get in a "fixed"-wing airplane. It will hover in the wind.

My greatest concern was finding suitable material for the wing spars. Wooden dowels flex too much, as did the plastic material I found. I decided to use aluminum arrow shafts in two sizes. By telescoping the shafts to the required length and joining them with epoxy, I had exactly the spars I needed.

The shafts are secured to a triangular wooden nose block. (A clamp-and-bolt setup would work equally well.) The center shaft literally becomes a keel, while the two on the outside act as outriggers. Approximately a quarter of the length of the keel back from the nose block, I mounted an arrow-shaft cross-brace to hold the outriggers at the proper angle. I then made an aluminum clamp with which I bolt the "keel" to the plywood pylon.

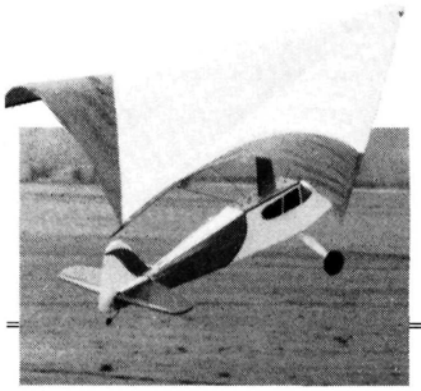
By now, you should be getting the idea. The parameters for this project aren't strict: you can use almost any material to cover the framework; just remember that the wing area is three to four times that of a conventional wing. I chose "rip-stop" nylon, which was originally developed for racing-yacht sails and is almost indestructible!

With the help of my wife, a sewing machine and some careful measuring, I covered the wing in about 1 hour. If you cut the nylon with a hot soldering iron, it should fray very little. I used nylon thread to sew all the seams. The covering material should be slack between the spars. (This was the first wing I'd ever built for which the covering didn't have to be

Here's one wing that can "fold" and not cause you to crash. Adaptable to any size of model

It may look ungainly, but it's a very efficient configuration that's easily adapted to most high-wing models.

ROGALLO WING

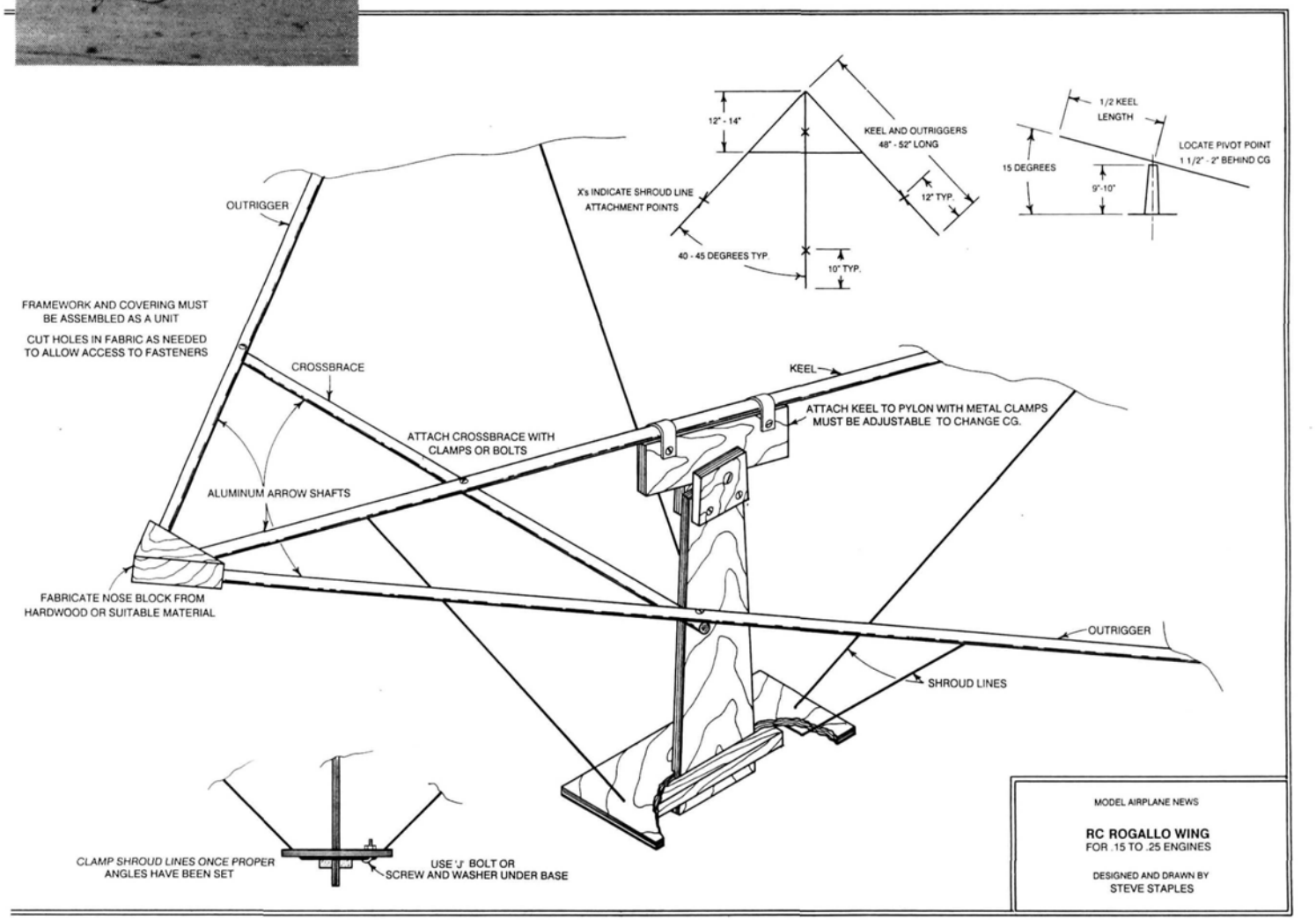


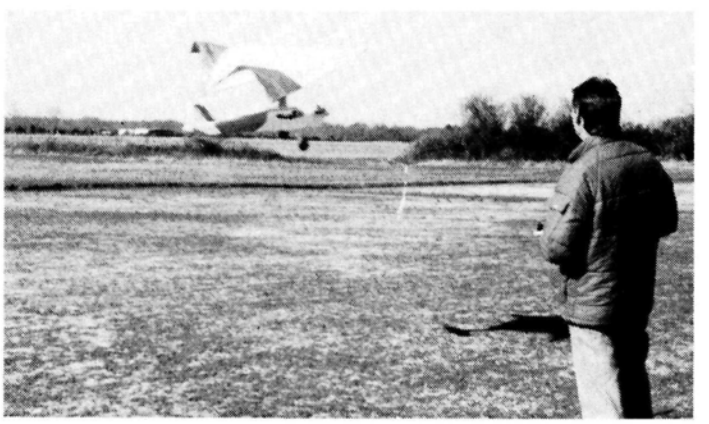
taut.) After pulling on the covering, I attached the cross-brace. When everything was assembled, I used braided nylon for shroud lines. Although this works well enough, it seems to stretch too much, and I plan to change to C/L braided-steel cable.

OFF TO THE FIELD

With the assembly ready to be attached to the victim—I mean, to the plane!—it was time for a field trip. The angle of incidence was set at approximately 15 degrees; the weather was perfect; and the crowd—refraining from comment—hung back politely in awe. The initial flight was a success!

A hand-launch at full throttle gave a surprisingly good climb-out, and rudder and elevator control were mushy, but adequate. The throttle proved to be the main control of altitude and attitude; at idle, the other controls were almost nonexistent. After I had adjusted to these quirks, touch-and-gos were easy and amazing. Hovering into a 5 to 10mph breeze is just a matter of tweaking the throttle, and I can make blazing, 10mph flybys.





The Rogallo wing can be made quickly for very little money, so if you're tired of your plane, try a flex-wing. It's fun—and isn't that what our hobby is all about? ■

QUIET FLIGHT

(Continued from page 79)

JS&A, *3100 Dundee Rd., Suite 801, Northbook, IL 60062-2429. Tel: (708) 564-7000.*
L.A.W. Racing Products, *1229 Capitol Dr., Addison, IL 60101.*
Bolly Props, *c/o Tom Dixon, 1938 Peachtree Rd., Suite 401, Atlanta, GA 30309.*
Archaeopteryx Avion Associates, *128 Etra Rd., Hightstown, NJ 08520.*
Beemer R/C West, *17252 Falcon Dr., Suite #3, Fountain Hills, AZ 85268.*
Hobby Lobby International, *5614 Franklin Pike Cr., P.O. Box 285, Brentwood, TN 37027.*
J.M. Lupperger Plans, *947 Joann St., Costa Mesa, CA 92627.* ■

TSUNAMI

(Continued from page 73)

I tried some aileron/elevator aerobatics. Most maneuvers were much smoother when entered from a shallow dive (to gain air speed). The model will loop, roll and fly inverted, and if you keep the speed up, you can combine these capabilities to fly an interesting routine. The BEC unit worked flawlessly and certainly adds to the model's performance by eliminating the weight of an airborne battery pack.

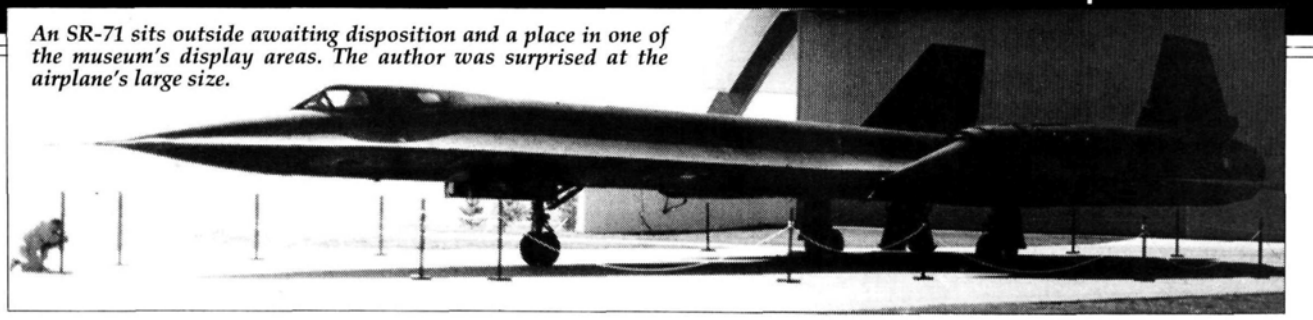
CONCLUSION

The Tsunami's retail price might seem high for such a small model, but when you consider everything you get and the good flight characteristics of the finished ship, you'll probably agree that it's a good deal. You can keep the Tsunami in your car (fully assembled) and fly it at lunch, or at any time when you have a few extra minutes and a large, open field. The Tsunami is definitely a lot of fun in a small package!

**Here are the addresses of the companies mentioned in this article:*
Union Model Co., Ltd., *distributed by United Model Distributors, 301 Holbrook Drive, Wheeling, IL 60090*
Tekin Electronics, *970 Calle Negocio, San Clemente, CA 92672.*
Novak Electronics, Inc., *128-C E. Dyer Rd., Santa Ana, CA 92707.* ■

GIANT STEPS

Ohio is for modelers—Toledo and the Air Force Museum help!



An SR-71 sits outside awaiting disposition and a place in one of the museum's display areas. The author was surprised at the airplane's large size.

by DICK PHILLIPS

TOLEDO! MANY think of Corporal Klinger's home, but to modelers, it's Mecca for one week in April. We go to Ohio to see the new goodies, talk with the movers and shakers in the industry and meet friends. This year, my partner Colonel Jack de Vries and I arrived a day early so we could make a quick trip to Dayton's USAF Museum at Wright Patterson. (It's only 2½ hours from the Toledo airport.)

USAF MUSEUM—WRIGHT PATTERSON

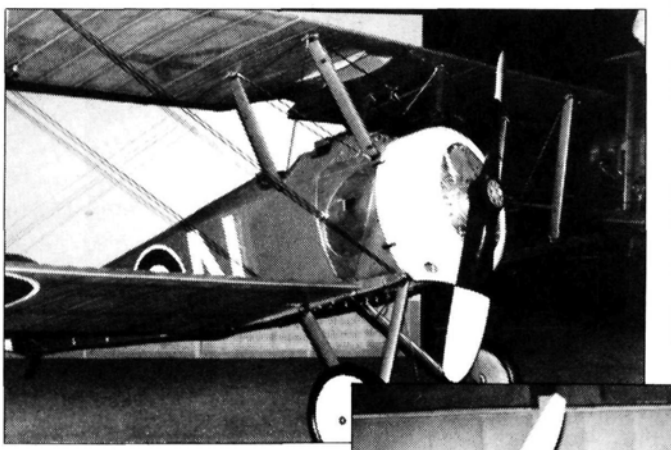
I remember wandering around the Wright Patterson field 20 years ago and looking at airplanes that were displayed in no particular order. Things have changed, to say the least. The Museum now has two very large hangars; one hangar houses a B-36, and there's room to spare!

The displays represent the chronological development of the airplane—from the Wright Brothers' plane to rockets. The Wright Brothers' wind tunnel is also there, along with many interesting photos. Several large-scale models represent the full-scale versions that are either unavailable or have yet to be restored. Many have been built by modelers like you and me, and there is even information on pre-WW II planes from this magazine.

You'll be able to inspect all sorts of equipment, e.g., engines, landing gear, propellers, wing sections, wind tunnels and parachutes. Many of the well-known WW II bombers and fighters are displayed, and for a couple of aging airplane buffs like the Colonel and me, they were great to see. Planes like the P-51, P-61, P-47, P-40, B-24, B-25 and A-26 brought back a lot of memories.

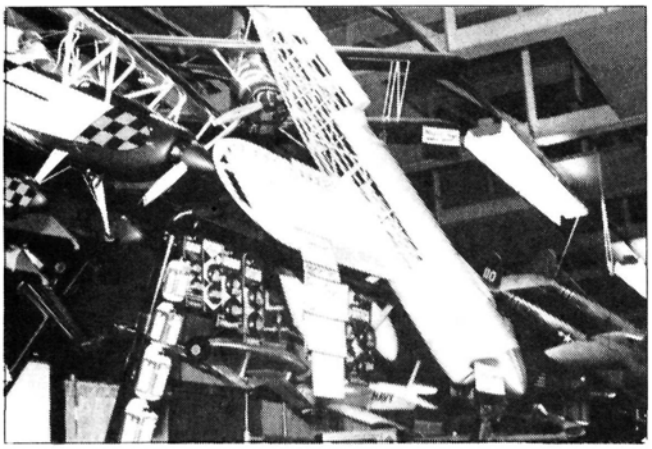
There were even more airplanes on display outside the hangars—an Iron Annie (Ju-52), a Constellation and a B-1 were some of the planes available for close inspection. One airplane that has fascinated me for some time is the SR-71. It was a real thrill to get close to a plane that has been kept pretty quiet for many years. A menacing and surprisingly large airplane, it was most impressive. Nine of them have been recently retired from active service, and they're being consigned to museums around the country. We spent the better part of a day in the main building. We never reached the second or third buildings! (A free shuttle bus runs regularly between the two locations.)

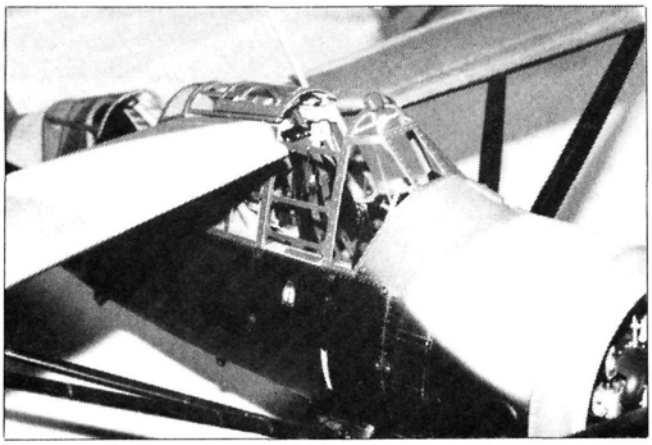
Some time ago, I received a letter from a Californian who restored a Westland Lysander. It's now at Wright Patterson, but I didn't have time to

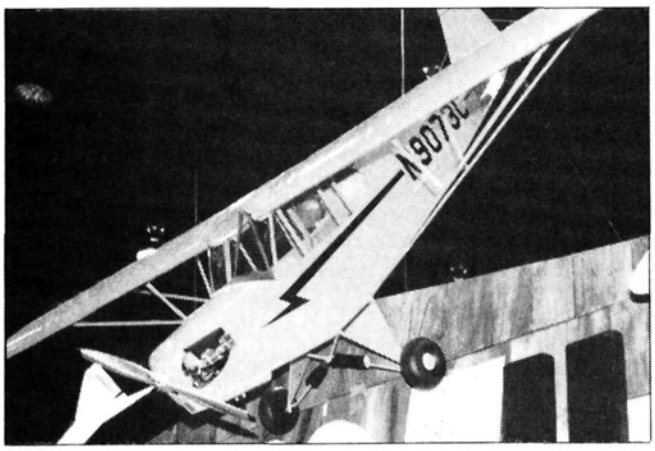


Nieuport looks better than new. It's unlikely that active service machines had such careful paint jobs.

WW I is well-represented at the USAF Museum at Wright Patterson in Dayton, OH. Beautifully restored originals provide insight into the past. Note axle stands keeping weight off the tires.







Top: Bare-bones Miss Los Angeles by Walt Moucha Models appears to be an excellent kit. It's well-engineered, and the quality of the wood is good—a truly fine 1930's racer.

Middle: Excellent detail work on Precision Scale Lysander. Very nice work; not unusual at Toledo show.

Bottom: Balsa USA's 1/3-scale J-3 Cub kit is complete and includes such items as scale gear with bungees. It's an impressive model and should fly very well.

Arena interior on Saturday with crowds filling the aisles. The balloons were "raced" later in the day. Their figure-8 course made for some tricky maneuvering!

see it. Next time, I plan to stay at least a couple of days so that I can take my time and see everything.

TOLEDO

The members of the Weak Signals Club have been organizing the Toledo Show for so many years that they make it look easy. It's a great three-day show, and it's obvious that the organizers know what they're doing. Thursday is set-up day and, with all the apparent disorganization, you wonder how the show will ever take place, but on Friday morning, everyone is ready for the crowds. Some booths are always up long before any others, e.g., the Sig and Byron Originals booths. I don't know how they do it, but they're always ready before I get there, no matter how early I get up! The show didn't seem as crowded this year, but it was the same great show, and I was able to talk with a lot of people.

Many of the display models were in the larger sizes, and anyone who thinks large models are a fad need only look around the tables at Toledo to be proven wrong! There were a lot of interesting items, e.g., Balsa USA's* new 1/3-scale J-3 that comes as a complete kit.

Wendell Hostetler* had his newest plans-built model—a Cessna 206 Turbo that certainly qualifies as big. Its span was just a touch over 10 feet; its weight was just under 30 pounds; its wing loading was under 30 ounces per square foot; and the suggested power was from 2 to 5hp. I'd stay at the higher end of that scale, because with 2hp, this Cessna could be a bit of a dog. The sample that Wendell had on display was a beauty and a tribute to his building and finishing skills.

Byron Originals* had its new Ryan ST-A on display. When I was a youngster (a long time ago), the Ryan was *the* sport airplane of the day. Byron's version is in 1/4 scale, and it spans 90 inches. I may have to "force" myself to build one of these pretty birds.

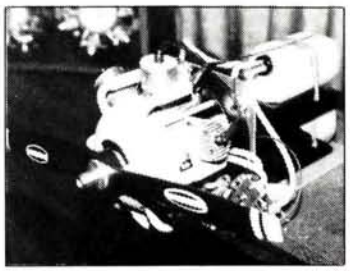
Walt Moucha's* designs show his considerable experience, and he has some excellent kits in the pipeline. At Toledo, he showed a bare-bones Miss Los Angeles, and for those of you who are racing airplane fans, it looks like a

superb kit. It spans 73 inches at a scale of 3.75 inches to 1 foot.

A couple of the regulars didn't attend this year. I missed exchanging jokes with Dave Platt and talking with Nick Ziroli and Nick Jr. Nick Sr. has been around the modeling scene for a long time, and I always enjoy talking with him.

BYTE OFF SOME TESTING

Curtis Givens has written a book entitled "CAMADAT —Computer Assisted Model Airplane Design and Testing"



A six-cylinder radial? Yep. To produce this geared radial engine, Radial Engine Technologies has put together six K&B Sportsters. It runs quietly and is vibration-free. Six cylinders look unusual, because radials usually have an odd number.

that's published by ViP*. He has a number of computer programs for model builders, and they're available in book form. An optional disc provides the programs ready to load. If you loft your own airfoils often, there are a couple of programs that will make the work faster and easier.

As usual, the Toledo show was great. Try to make it next time, and I hope to meet you there one day.

**Here are the addresses of the companies mentioned in this article:*
***Balsa USA,** P.O. Box 164, Marinette, WI 54143.*
***Wendell Hostetler's Plans,** 1041 Heatherwood La., Orrville, OH 44667.*
***Byron Originals,** P.O. Box 279, Ida Grove, IA 51445.*
***Walt Moucha Models,** P.O. Box 112, Menominee, MI 49858.*
***ViP Publishers, Inc.,** P.O. Box 16103, Colorado Springs, CO 80935. ($19.95 plus $2 postage.)* ■

AIRWAVES

(Continued from page 35)

because it's red, has flat sides and hides the motor. I'll probably be beaten by an SE-5 or a Jenny.)

Contact Ralph Biddle, 2156 Street Rd., Warrington, PA 18976 (Tel: 215-343-6245), who will CD the event.

PETER VAN DORE
Elkins Park, PA

Thanks for the heads-up, Pete. I think this kind of event could really spark some interest in the already growing ranks of 1/2A Texaco fans. Why not send us some coverage of the event? Good luck!

RAU

Is Flying Inverted the Solution?

A great deal has been published on engines, but I haven't been able to find any information about inverted engine operation. I have a Top Flite P-40 that's perfect for an inverted engine, but everyone in my flying club tells me to stay away from inverted engines. Club members cite burned-out plugs, flooding problems and difficult starting as reasons. Are these statements valid? Can I mount my engine inverted and still get good, dependable performance? I hate the idea of cutting a hole in the top of the fuselage.

JOHN SANNINO
Somers Point, NJ

No problem, John—especially in the case of the TF P-40. It's designed for an inverted engine installation, which places the tank in the proper relationship to the carburetor. As long as you observe the basic fuel-delivery-system guidelines for any engine, inverted engines run and perform just as reliably as upright, or even "sidewinder" powerplants. Inverted engines can sometimes seem harder to start because incoming fuel quenches the glow-plug element more easily, and we tend to continue cranking, which makes the flooding worse. In these cases, the simple solution is to invert the airplane while you start the engine. This places the cylinder in the "upright" position. If operating our engines inverted were a problem, all our flying would be straight and level. Have fun, and show 'em how it's done!

RAU

We welcome your comments and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News,** 251 Danbury Road, Wilton, CT 06897. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we cannot respond to every one.

HELICOPTER SECTION

***HERE'S A GREAT** shot of our author Dave Ramsey, who seems to be doing the impossible—flying two helis simultaneously! Actually, he isn't; a flying buddy maneuvered his machine into the shot, just to create the illusion. On the following pages, Dave looks at the Schluter Bell 222UT, but if you want to see the actual machine and many others, they'll probably be at the Robbe/Schluter Heli Cup '90, which will be held in New Jersey on September 15 and 16. For more information, contact Vince Canzanese at Robbe (1-201-359-2115).*

Heli ace Datu Ramel presents Part I of "Hints and Helo-Ese," and whether you're a novice or an experienced flier, I'm sure you'll find many useful tips in his article.

Rounding out the heli section we have our regular "Helicopter Challenge" from Craig Hath. This month, Craig offers a different, and practical, way to learn the intricacies of heli flying, and he also evaluates some new equipment that should make flying easier and more enjoyable.

Coming next month: Part II of "Hints and Helo-Ese," coverage of Kyosho's .30 Heli Contest, scale finishing techniques and lots more.

We're still looking for more photos to show in "Pilot Projects," so keep them coming! ***RAU***

Proven mechanics and a slick body make a very scale-like package

by DAVE RAMSEY

ROBBE Schluter BELL 222UT

SCHLUTER'S 1/10-SCALE Bell 222UT HelicopterFuselage Kit is designed to fit his Junior 50 helicopter. The kit includes a two-piece, white, gel-coated GRP (epoxy/glass) fuselage with separate, white, gel-coated GRP winglets. The fuselage is absolutely beautiful and must be seen to be appreciated. All the necessary structural components, parts with which you can adapt the Junior 50 mechanics to the fuselage, longer skids, formed windows and jet exhausts, a comprehensive plan, instructions and self-adhesive decals are also included.*

PHOTOS by DAVE RAMSEY; FLIGHT SHOTS BY CARL HEINECK

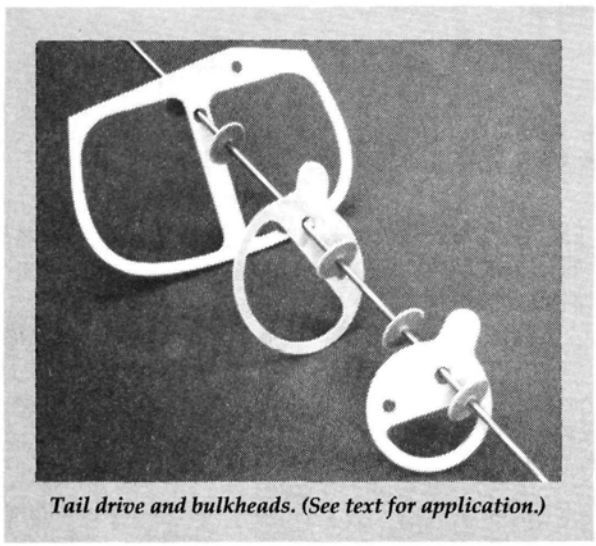
■ *Top: Bell 222UT Lifestar.* ■ *Above: Robbe's Vince Canzaneze flew the Bell prototype 222UT and the author flew the Lifestar—tension! When the author's machine passed over the Bell, down-wash pushed the Bell into the ground, but somehow, they managed to avoid each other.*

Schluter
BELL

The 222UT Fuselage Kit makes a wonderful addition to the Junior 50 mechanics. Build it with the parts supplied, and you'll have a simplified stand-off-scale Bell 222UT. With proper planning, a full-forward cockpit and instrument panel can be accommodated, as can any other details you care to add. Fixed wheels, or even retracts, will convert the 222UT to a 222B, but you'll need additional structural reinforcement.

Bell is planning revisions to the 222 series, and the main change will be the addition of twin Allison turbine engines. The new model is designated a Bell 230. For modeling purposes, the major change to the 222 is the use of dual exhaust tubes that are similar to the single exhaust tube on the Bell 206L Long Ranger III.

I made my second 222UT to represent the Bell experimental prototype 222UT. Unlike my Lifestar 222UT, I built it without adding details. I wanted a model that looked like a scale helicopter, but had a more visible fuselage shape—but I didn't want to spend so much time on finishing that I'd dread a crash.



Tail drive and bulkheads. (See text for application.)

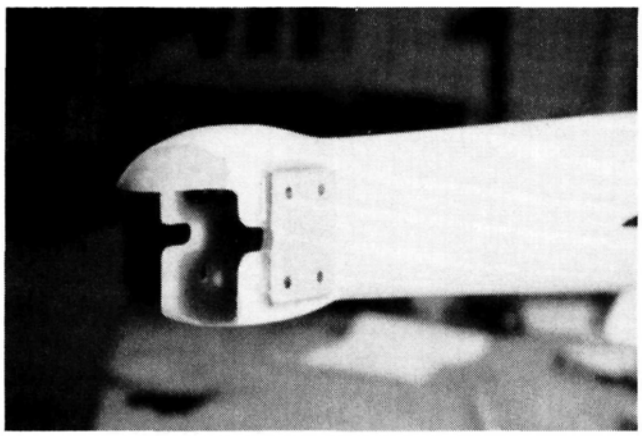
"Building the 222UT is time-consuming, but quite easy."

Building the 222UT is time-consuming, but quite easy. If you're careful during assembly, you might not even have to paint the overall fuselage. You could just cover the seam with a strip of sheer white tape, and add trim made of colored self-stick material or paint. A self-stick decal sheet comes in the kit, and it includes printed "screening" for the fuselage vents, so you don't have to cut these areas out. Cover the fin with self-stick material, and the wooden stab, with iron-on film. After that, you only have to align the mechanics and the fuselage assembly accurately.

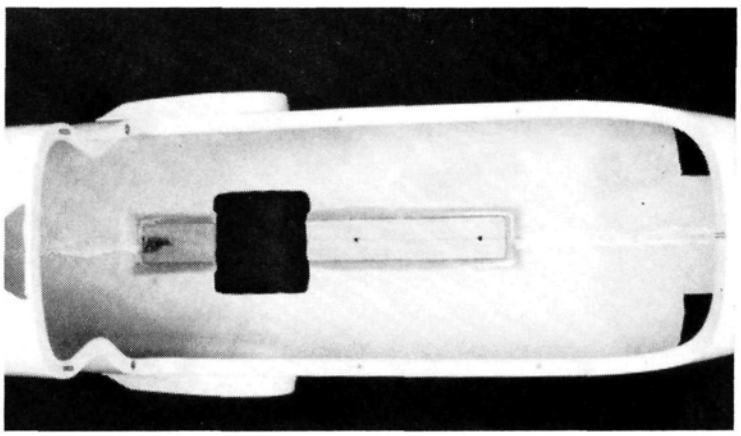
CONSTRUCTION

If you plan to install a well-used Junior 50, I suggest that you rebuild the mechanics. The Junior 50 I used on my second 222UT was 2 1/2 years old and had been run for about 40 hours. Almost all the bearings were original, and when I removed them for inspection, they sounded very dry (permanent lubrication *wasn't* so permanent!), so I replaced them.

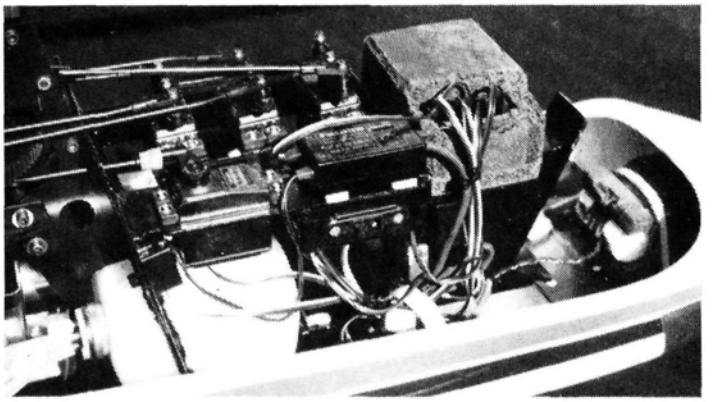
Everything you'll need to accommodate the Junior 50 mechanics in the fuselage kit is supplied. Let's say you have a Junior 50 and want to prep it for the 222UT. Begin by removing the tail-rotor control pushrod, the tail boom and the tail drive rod, and remove the tail fin and tail boom from the tail-rotor gearbox. You'll only need the tail-rotor gearbox. Disconnect the rocking servo pushrods, the throttle pushrods and the fuel lines, and remove the radio framework from the side frames. Remove the landing gear and related "U" channels from the side frames, and take the skid tubes off the struts. Cut away the top part of the wooden firewall below the



Tail cutouts and plywood fin standoff.



Installation of plywood mechanics reinforcement.



Mechanics and radio installation.

rocking servo pushrods, and remove the muffler. Most mufflers can't fit into the fuselage, but the S0922 muffler was designed specifically for the 222UT.

With your Junior disassembled, add the following parts. Join the new, longer, landing-gear skids to the struts. Fasten solid, threaded-aluminum blocks to the base of the side frames to replace the "U" channels. Two, short, aluminum tubes with bearing supports are supplied; push one into the tail-rotor gearbox, and, using the tail-boom supports, fasten the other between the side frames. Using the tail-tube support bolts, add an aluminum "U"-bracket fuselage support to the side frame. (You'll have to position and drill the holes.) Add the rest of the parts when you assemble the fuselage.

The comprehensive instructions are very straightforward, but perhaps oversimplified! After reading them, I thought, "Hey, this will be a piece of cake!"—well, not quite! Based on my experience with the first kit, I revised the building order and modified the construction methods. If you're considering building the 222UT, you might find it helpful to study these additions, and if they make sense to you, incorporate them into Schluter's building sequence.

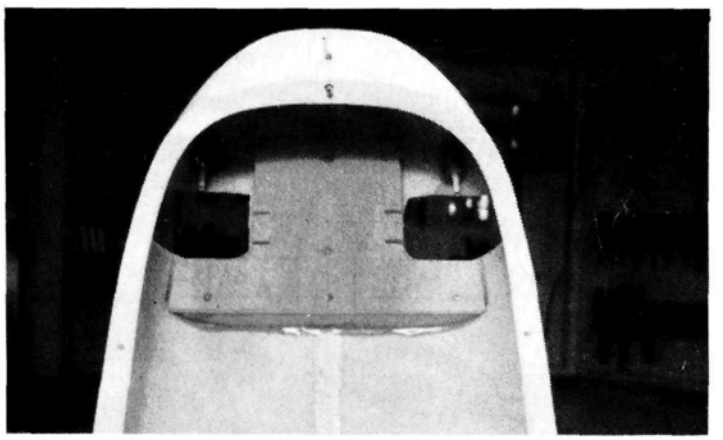
The best adhesives for joining the wooden parts to the fuselage are slow- to medium-setting epoxies. I've found it very easy to separate a CA/fiberglass bonded joint, so use CAs only for tacking. I've been using PIC* Coating Resin with excellent results. Thickened to a paste with talcum powder, it's good when you need a thicker epoxy.

Begin construction by thoroughly sanding the inside of the fuselage halves wherever parts are to be bonded or painted. Flatten the inside seams where wooden parts will touch. It might not be possible to level the seams in the fuselage tail, as the areas where bulkheads are attached are "close-quartered." In these areas, sand back the plywood where it comes in contact with a seam, and trial-fit.

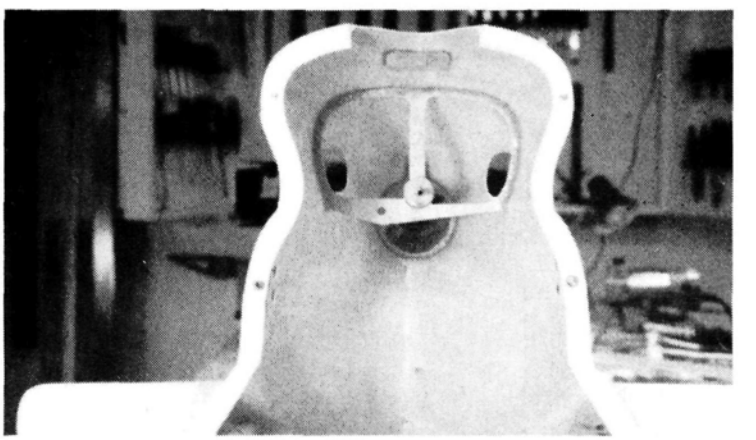
CONSTRUCTION ALTERNATIVES

Keep these alternatives in

Right: Sponson installation is accomplished by gluing a rubber band inside the sponson and holding it in place on the fuselage with a dowel while the epoxy sets. The outside seam is taped to hold the alignment. Note the blind-nuts along the fuselage edge; they're embedded in plywood reinforcement. The two holes inside the fuselage behind the left blind-nut facilitate the removal of the fan shroud bolts while the mechanics are installed. (See text.)



Optional nose reinforcement for forward battery mounting.



Bulkheads and tail drive installed.

mind as you follow Schluter's suggested building sequence:

• Schluter supplies two large chrome nuts with which you're supposed to attach the fuselage hatch to the fuselage. The size and position of the hatch requires that part of the rear windows be cut away. To avoid this and keep the window opening intact, use two socket-head bolts—steel or nylon—and blind-nuts (3 to 5mm or 4-40 to 10-32).

Remember that the seam on the outside of the fuselage is, as far as I can tell, an accurate center line. The seam on the fuselage hatch might not match it and might not be centered with the fuselage. Determine the actual center line before you align these parts.

• To simplify the assembly of the mechanics and bulkheads, rough-cut all the windows and the openings for the jet exhaust and intakes, the stabilizer, the swashplate and the cone

Bell Experimental Prototype 222UT.

start. Don't cut out the large hole in the fuselage beneath the side frames, because it's easier to install the plywood mechanics plate without it. Drill the holes for the tail-rotor gearbox.

• Make sure the mechanics are flat, vertical and centered when you glue the plywood support into the fuselage.

• If you're installing one of the early Junior 50 mechanics with the single (left/right), ribbed, tail-rotor gearbox, you'll have to notch the fuselage where the gearbox is attached. The aluminum fin is al-

"Some radios, both FM and PCM, react adversely to metal-to-metal contact in the tail-drive system."

ready notched and can be used as a guide. It might be advisable to buy a new gearbox, because there's better access to the grub screw that attaches the drive wire to the tail-rotor drive gear.

• *Note on tail drive:* Some radios, both FM and PCM, react adversely to metal-to-metal contact in the tail-drive system. I have a Futaba* 7FGK (FM) that won't tolerate a steel drive wire in a brass tube. My Lifestar with a steel/brass drive works well with my Futaba 9VHP (PCM). Since I planned to use the 7FGK in this 222UT, I changed the tail drive in the following way:

I run the provided 2mm tail-drive wire inside a length of "Tefsel" plastic tubing (1/8-inch o.d. x .093 i.d.), which is, in turn, run inside a piece of K&S 5/32-inch o.d. x 1/8-inch i.d. brass tube that's cut to the same length as the provided 3mm brass tube. The holes in the short tail-tube plastic bearings are drilled to accept the 5/32-inch brass tube.

Tefsel tubing can be obtained from larger plastic supply or industrial supply houses. If you can't find any, use a Heim PVC plastic tail tube. For adequate tail-drive support between bulkheads, you must use the 5/32-inch brass tube with the plastic tube and the wire drive. Don't consider using 5/32-inch aluminum tube; it's too soft and won't spring back if it's bent.

• Though the plywood tail-rotor support bulkheads are accurately cut and marked for drilling, irregularities in the fiberglass can throw out the alignment of the tail-drive brass tube. To solve this problem, I enlarged the 3mm bulkhead holes to 1/4 inch. (Make sure the holes for the flexible, plastic pushrod will allow easy, slide-in installation.)

Now, you can install the bulkheads. To fit the brass tail-rotor drive tube, mount the mechanics and feed the brass tube (with drive wire from the rear) into the side-frame attachment tube. Next, fit the tail-rotor gearbox to the brass tube and drive wire, and loosely bolt the gearbox to the tail. (To keep this working for as long as possible, it's best to keep the drive tube straight.) When this is set up, be sure that the brass tube runs through all three bulkheads without touching them. The brass tube should "float" inside the bulkhead holes, and you should remove any wood that hinders this alignment.

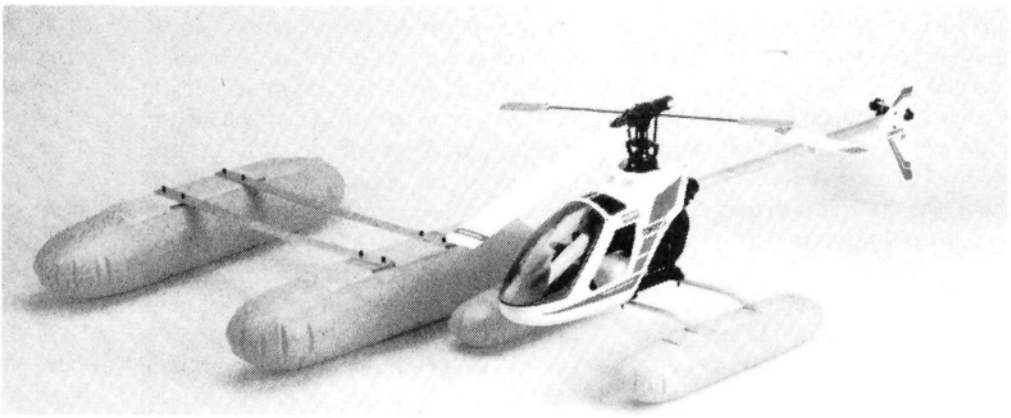
The plans show a straight run for the tail drive from the mechanics to the tail-rotor gearbox, and with the aforementioned setup, we have that straight run. Now, you only have to attach the brass tube to the bulkheads—easy! First, using 1/16-inch plywood, make three 1/2- to 3/4-inch discs with 1/8-inch (3mm) holes in their centers (or 5/32-inch/4mm holes, if you use a larger tube). (The photo shows six discs, but three are enough). Put these discs onto the brass tube (without epoxy)—one disc in front of each bulkhead. With everything attached and the tail-rotor gearbox loosely attached, rotate the main gear to turn the tail-rotor drive wire. (The drive wire doesn't have to turn the gears in the gearbox.) The brass tube and the tail-rotor gearbox shouldn't exhibit any excessive movement. A little is fine, but too much play shows that the brass tube and the gearbox aren't aligned. To get the drive wire to run straight into the tail-rotor gearbox, you might have to move the gearbox up, down, or at an angle within the mounting holes.

At this time, you can align and attach the new vertical fin and plywood stand-off. Tighten the tail and check its alignment. On both my 222UTs, I had to rotate the gearbox clockwise (when viewed from the rear) to achieve a 90-degree alignment to the main shaft. To hold the gearbox in alignment, I added 1/64-inch plywood shims to the inside of the fuselage. When everything looks OK, apply a little epoxy to the plywood discs and press them against the bulkheads. Using the main gear, rotate the drive wire to make sure you haven't changed the position of the brass tube and brought it out of alignment; then *don't touch it* until the epoxy has cured.

• Before attaching the sponsons (winglets), open the vertical sponson wall in the fuselage, leaving an 1/8-inch lip. This saves weight and makes it easier to attach the sponsons. To obtain a good fit to the fuselage, you'll have to sand the

(Continued on page 107)

ROTARY-WING ROUNDUP



GREAT PLANES MODEL DISTRIBUTORS
Heli-Max Heli Floats

Hobbico announces a new line of helicopter accessories called "Heli-Max," which now includes heli floats for your .30 to .60 helicopters. They come in two sizes: one for .30 to .40 and one for .50 to .60 helicopters. Hobbico heli floats are made of heavy-duty vinyl and provide a safe landing on water or land.

Price: $19.95, $29.95

For more information, contact Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

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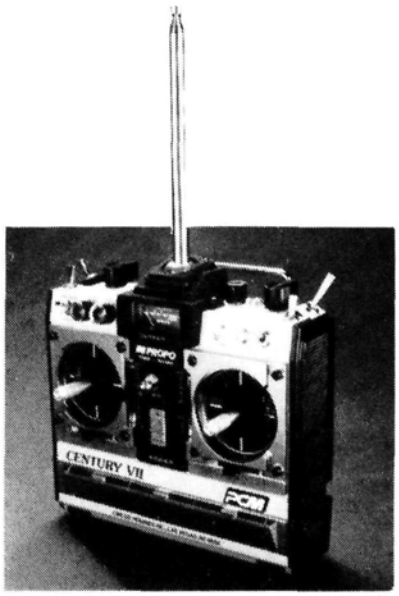
HOBBY DYNAMICS
Century 7 PCM from JR



The JR Century 7 PCM Helicopter System is unmatched by any other in its price range. It includes an ABC&W micro-receiver, four JR 501 servos, a rechargeable transmitter and airborne Ni-Cds, a Ni-Cd charger, a plug-in transmitter RF module, complete servo accessories and hardware. Features include: servo-reversing, dual rates, interference/battery fail-safe, ATV, ATS, a direct servo controller, a trainer system, throttle hold, throttle hover, high idle and an inverted flight system.

Part no. J7PH

For more information, contact Hobby Dynamics, 4105 Fieldstone, Champaign, IL 61821.

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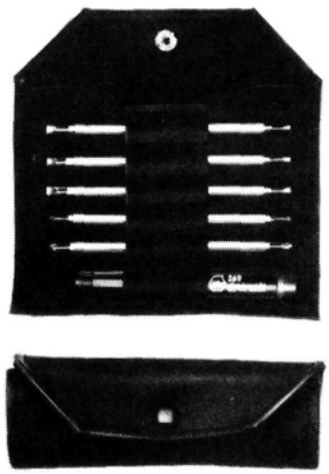

BONDHUS
Interchangeable Precision Screwdriver Sets

Wiha® Tools now offers Precision Interchangeable Screwdriver Sets in its popular line of hand tools. All three sets contain the distinctive Wiha handle and interchangeable blades that have two tip styles. They come in durable roll-up pouches, and their compact size and variety of tool combinations make them perfect for taking to the field.

Comfortable tapered handles, which are molded onto the blade, give increased control because they have a fingertip rotation cup on their ends. The blades are hardened and plated steel, which produces high-quality, durable screwdrivers; the precision-tolerance black-oxide tips are widely appreciated by users. All Wiha products are available in sets or as individual pieces.

For more information, contact Bondhus Corporation, 1400 East Broadway, P.O. Box 660, Monticello, MN 55362.

KALT (HOBBY DYNAMICS)
The "Whisper"

This terrific electric-powered R/C helicopter joins the ranks of Kalt's gas-powered helis. With Bell/Hiller mixing, a powerful Mabuchi RX540VS motor (included) and a state-of-the-art tooth-drive belt, the new Whisper will surely be a hit.

This model has an entirely new structural design. Made of strong, yet light materials, the new Whisper is capable of longer flights. The main rotor head has collective pitch and a fiberglass, dual, flapping rotor system, which provide outstanding hovering stability and flying control. The Whisper is an excellent training helicopter, but it's also great for experts who want fun and performance flying!

For more information, contact Hobby Dynamics, 4105 Fieldstone, Champaign, IL 61821.

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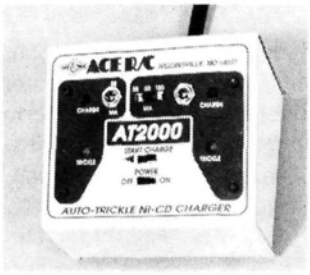

ACE R/C
AT2000 Dual-Output Ni-Cd Charger with Auto-Trickle

You can plug your radio system's batteries into the AT2000, hit the "Start Charge" switch, walk away and be confident that they will be safely and fully charged to 100 percent at the overnight charge rate. To maintain the full charge, the unit automatically switches into the trickle mode and remains there until you unplug it.

The AT2000 has two outputs: one is fixed at 50 milliamps (the overnight rate for 500mAh Ni-Cds); the other has three currents—25, 50 and 120 mA for small, standard and large packs. Both outputs operate at 10mA in the trickle mode. Either output can handle from 1- to 10-cell packs and can maintain the constant-charge current, so the unit can be used to charge single-cell starter batteries, 4- or 5-cell receiver packs, and 8- or 9-cell transmitter packs. The AT2000 is very versatile.

Hook-up to the AT2000 is by means of readily available 0.10-inch pin power plugs. Adapter cables are available for a variety of systems, or you can easily make your own. Two power plugs are furnished with the unit, and they can be used with your existing connectors. The AT2000 comes fully assembled and tested.

Price: $49.95

For more information, contact Ace R/C, 116 W 19th St., P.O. Box 511, Higginsville, MO 64037.

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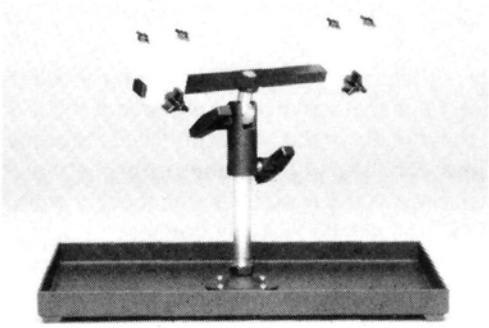


LIGHTNING PRODUCTS
RotorCraft Workstation

This Workstation was specifically designed for building, repairing and displaying R/C helicopters, and it's made of durable, high-tech materials. A unique, fully rotatable, skid-clamping system securely holds R/C helicopters larger than .60 size and tilts up to 180 degrees to allow a number of working angles. A heavy-duty pedestal mount and base tray provide a steady platform at any angle. The Workstation can be mounted on a sturdy tripod for use as portable field workstand, and it fits many 1/4-scale car chassis.

For more information, contact Lightning Products, P.O. Box 1607, Tomball, TX 77377.

HINTS AND HELO-ESE PART I

A seasoned heli flier reviews his log book and shares some helpful information

by DATU RAMEL

DURING THE LAST four years, I've assiduously taken notes on and kept logs of my heli experiences. With the help of this material, I've compiled these tips, which I hope will help you get quality air time.

UNDERSTANDING ENGINES

1. With any R/C helicopter engine, you first have to determine the idle-mix-screw setting. These screws are supposedly set at the factory to some nominal setting—say 2 to 2 1/2 turns out. Refer to the instructions, and use a marked screwdriver to verify the setting by turning the screw in (clockwise) all the way while you count the turns. Then open the mix valve by unscrewing it the same number of turns (if it was set correctly). If it wasn't, set it to match the setting specified in the instructions.

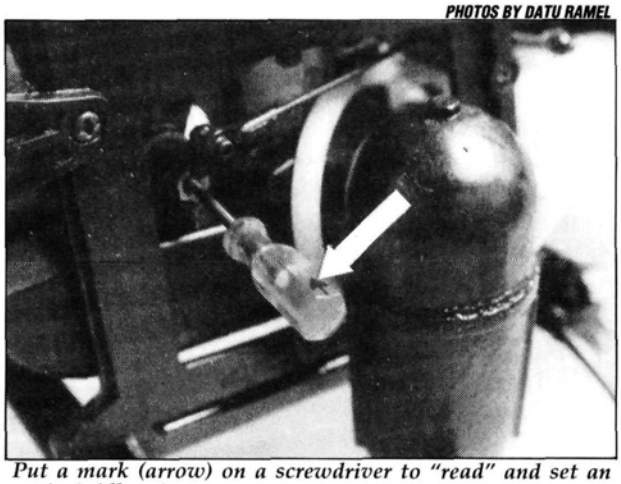
Engines that have been used for a season or more are susceptible to having their mix screws loosen and drift "every few tanks." If you're having trouble with an old engine (it runs too rich or too lean, even after you've checked the fuel system), check the idle-mix screw.

2. When you note the idle-mix and needle-valve settings that make your engine run well, don't forget to write down the pitch curve and atmospheric conditions, too. The pitch settings probably won't change much once you have the whole machine working well, but the best needle-valve setting may vary according to air temperature and humidity. You'll appreciate being able to read your notes about that day last month when the air felt just like this and your helicopter flew so well.

3. If you don't fly in extremely hot or high places, you'll probably be able to hover your ship on fuels with 10 to 15 percent nitromethane. When you've achieved forward flight, don't be afraid to try 20-percent-nitro (or more) blends. A high-nitro fuel is especially useful on very hot days, because a good needle-valve setting is easier to achieve under such conditions if you have a more lively blend. Some of the top Japanese FAI competition pilots use 35-percent nitro in their .60-size ships; but .30-size heli engines shouldn't be fed this kind of juice unless they've been ported or modified.

4. Clean a carburetor by flushing it with fuel from both sides—from the supply side fitting and from the hole into which the needle itself is threaded.

PHOTOS BY DATU RAMEL



Put a mark (arrow) on a screwdriver to "read" and set an engine's idle-mix screw.

5. If the engine turns over (isn't flooded), but doesn't fire right away, try momentarily blocking the muffler exit hole with your finger. This increases pressure to the fuel tank.

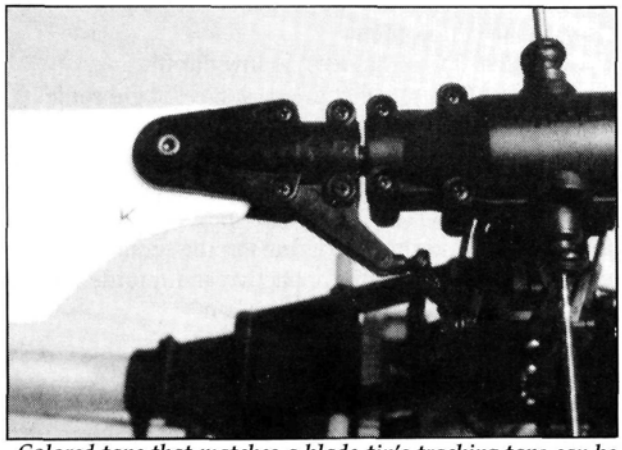
6. Between flights, disconnect or clamp the fuel-supply line to prevent fuel from being siphoned into the warm engine and flooding it. Use a spring clip or a hemostat for this.

LOOKING & LISTENING

The world of collective pitch and throttle curves can thoroughly bewilder new pilots. If you can't make sense of end points and idle-ups and servo differential and computer curves, don't feel bad. Anyway, all that stuff won't mean a lot to you until you have some actual experience besides hovering. The collective and throttle relationships can be optimized only with reference to *how the helicopter behaves when it changes state*—from hovering to a vertical ascent; from hovering to forward flight; from a high altitude to a fast descent; from a vertical descent to a hover; and from forward flight back to a hover (approaches).

7. If you're a beginner, observe other pilots and ask them what they did five years earlier, before there was so much set-up information available. Use the tachometer in your head! Watch a helicopter that resembles yours, or study a friend whose flying style you'd like to emulate. Listen to the "chosen" heli while it hovers, flies around, or does maneuvers. Make a mental note of how fast the engine and blades sound. Ask yourself whether your machine sounds just as fast (possible), not quite as fast (more likely), or much slower (likely) than the machine you're studying.

When you have a feel for the speed of your rotor head relative to that of a heli that flies well, listen even more closely for variations in head speed as the subject heli changes state. Pay special attention to how, if at all, the sound of the machine changes during a sudden vertical climb, or during a steep descent. A well-set-up helicopter won't display a noticeable change in head speed or engine sound as it changes from slow to fast, low to high, or vice versa.



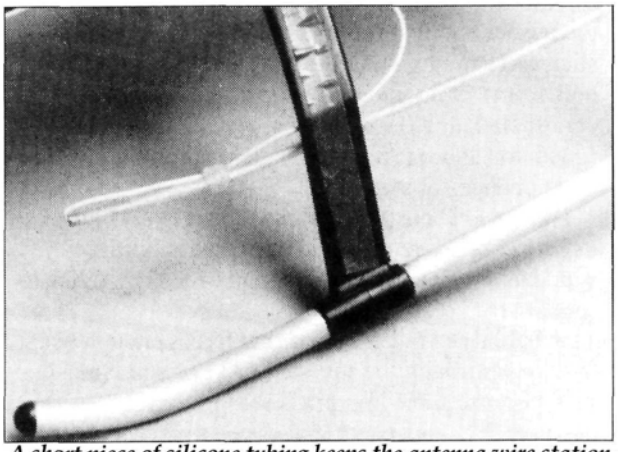
Colored tape that matches a blade-tip's tracking tape can be used to mark the matching grip. In this photo, the blade is marked with the letter "K" to match the manufacturer's name on the yoke.

8. Once you know what a good setup sounds like, ask the pilot whose ship you've been watching some questions:

- Is he using blades of stock length, chord, profile and weight? (possibly not).
- Is he using the factory-recommended hovering pitch setting? (He's probably using slightly less.)
- Can he tell you what his hovering pitch setting is in degrees, based on readings taken with a gauge?
- Does he have his transmitter set so that hovering occurs at half-stick, 5/8 stick, or 2/3 stick? (The most common setup is 5/8 stick.) To achieve that, did he have to offset the throttle servo wheel, or was he able to do it with the hovering throttle control? The instructions for most helicopters sold today specify a little throttle-servo offset, so that the throttle opens more than halfway for a half-stick setting.
- Is he using the preset idle-up curves in his radio, or has he altered them? Setting the first idle-up curve takes half-a-tank's worth of descents and approaches. Setting the second idle-up requires a full-tank's worth of aerobatics.

Getting someone to explain his throttle and collective setup while you have a clear idea of how his heli looks and sounds will do more for you than learning how to use this month's latest pitch gauge. In fact, most instructions are so comprehensive in specifying servo-wheel radii and rod lengths that you don't need a pitch gauge. *This works by using the pitch gauge in your head.*

9. Take the main blades out of their grips. Turn on your radio, and set the throttle-collective (T-C) stick at 1/6 (if you're just barely hovering), 1/4 (if you can hover in a strong wind), or 1/3 (if you can make a clean approach back to a hover from forward flight). Look down the feathering axis of the rotor head, from blade-bolt hole to blade-bolt hole. At the T-C stick position that matches your ability (1/6, 1/4, or 1/3), the top and bottom surfaces of the blade grips should be parallel to each other and to a level flybar, indicating flat, or zero degrees pitch.



A short piece of silicone tubing keeps the antenna wire stationary in the tube. Brightly colored trim tape on the landing struts helps on overcast days and during orientation maneuvers.

If the blade holders aren't lined up flat and parallel, adjust the pitch-control rods until they are. You can also

check to see whether the blade bolts in the grip holes are parallel to the main shaft. Have you ever hung a picture straight on a wall? You can do a good job of lining up the grips, and use this as a basis for setting throttle and pitch curves, as long as you've assembled the servo end of the linkage as the manufacturer specified.

Once you've zeroed the grips just by looking, put the blades back on and do a test hover for tracking purposes. Assuming your spindles (or axle) and blades are straight, you shouldn't need more than one turn on one of the links to achieve good tracking. Now you can use the hovering throttle control or positioning of the throttle servo wheel to get the head speed and sound you want in a hover.

10. Now do some test-climbing for the high pitch setting. From a hover, punch the T-C stick and (dust off the tach in your head) listen to the head speed and the sound of the engine.

- If it sounds *faster* during a climb (less likely), *raise* the high-end pitch.
- If it sounds *slower* during the climb (more likely, and shows that the heli is losing revs), *reduce* the high-end pitch.

On the low side of the stick, instead of matching the pitch setting to the wide-open throttle, we must establish a reasonable low pitch setting first and then match the low throttle opening to it. The rule used to zero the blade grips will, at the same time, give you usable low collective pitch. Flat pitch at 1/6 T-C stick gives about minus 1 degree of collective at low stick (a mild setting for brand-new pilots, but still enough to cause a boom strike in a panic descent); flat at 1/4 stick gives minus 2 degrees (this helps you to keep the heli from "ballooning" when it's hovering in gusty conditions); and flat at 1/3 stick gives minus 3 degrees (good for approaches, aerobatics, autorotations and other changes of state).

When you hear pilots talking about *"needing more negative,"* they're referring to two possibilities:

- an inability to descend as quickly as they'd like to

-or-

- an inability to reverse the lifting forces enough when they pass through the inverted parts of some maneuvers because their low pitch setting may be at, say, negative 1 1/2 degrees instead of negative 3 degrees. If there's minus 1 1/2 degrees pitch at low stick and zero pitch at 1/6 or 1/4 stick, there's a gradual transition from hovering settings to descending settings as the T-C stick is pulled back from the middle. If there's, say, negative 3 degrees at low pitch and zero pitch at 1/3 stick, then there's a more rapid transition to descending settings for hovering or forward flight: the altitude control (left stick) is more sensitive. This is why very new pilots are urged to stay away from low pitch settings (below negative 1 degrees)—so they don't suck their helicopters right into the ground!

Setting up negative collective pitch at low stick doesn't mean you'll ever use it while flying. If your helicopter hovers at 5 degrees pitch, 4.9 degrees pitch is enough to bring it down. If your heli tools around in fast forward flight at 4 degrees pitch, a roll may call for a reduction of collective to 1 or 2 degrees as the machine passes through inverted, and you aren't likely to grab full-low T-C stick and negative 3 degrees during the maneuver. When we say we "need more negative," we mean we need more collective-pitch sensitivity or response below the hovering settings. We set up such a response by establishing the lowest point of the pitch curve at some negative value. The pitch settings available at, or slightly below, mid-stick to get this response are still positive when measured in degrees.

11. When you have a usable low collective setting, it's time to make the engine happy when the stick is below halfway. Most entry-level helicopter radios have a fixed idle-up pivot point that matches the hovering settings at mid-stick; computer radios let you vary this point.

When you first start using idle-up, don't worry about the point. On the transmitter, there's an idle-up knob that allows you to vary the rate, or slope, of the throttle curve below half-stick. Hover at 15 to 20 feet, and lower the T-C stick to initiate slow, controlled descents. Before coming back to a hover, listen to the speed of the rotor head and the sound of the engine. It probably sounds slower when descending than when hovering. Switch on the idle-up, turn the knob to a low setting, and try another descent. The head speed should sound faster now during descents. Repeat the test until the heli sounds the same when descending as when hovering.

Think about it: for most sport and weekend R/C heli pilots, an adequate throttle or collective "curve" is defined by just three points:

- low pitch (-3 to -1 degrees) at low throttle
- hovering pitch (3 to 6 degrees) at hovering throttle
- high pitch (6 to 10 degrees) at high throttle.

The rule I gave earlier (about assigning zero pitch to somewhere below half-stick) puts a reasonable hovering pitch setting at just above half-stick. This allows you to find a good matching hovering throttle setting and gets you into the ball park for collective and throttle curves without making you tear out your hair!

GETTING PSYCHED!

Somewhere during their first season of flying model helicopters, it dawns on every pilot: "I spend more time fixing than flying!" The tinkering-to-hovering ratio is greater—much greater!—than 1. Most of your time in this hobby is at first spent on learning how to operate a helicopter. The short time that's left is the actual stick time when you can enjoy the hobby and add to what you've learned about controlling these machines. Successfully operating a helicopter means getting it to run so well that you can concentrate on the flying.

12. You can't practice or improve if you don't have confidence in your equipment. Accept that spending a lot of time getting your engine to run relia-

(Continued on page 119)

Helicopter Challenge

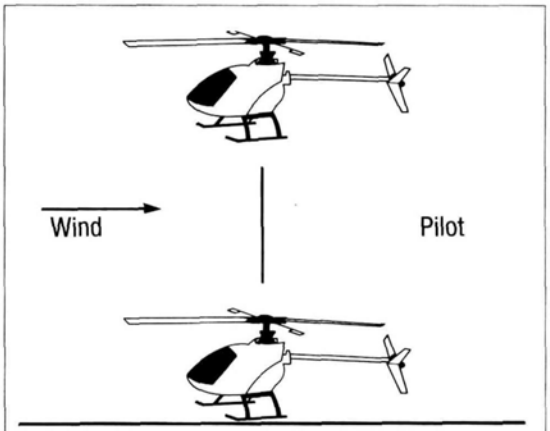
by CRAIG HATH

30 heli competition, Craig's 10-point plan and goal-setting

.30 HELI CONTEST

I'VE JUST returned from the first annual Kyosho Challenge in Champaign, IL. To say that I had fun would be an understatement: I had a blast! Datu Ramel will give you in-depth coverage in a future issue, so I'll be brief.

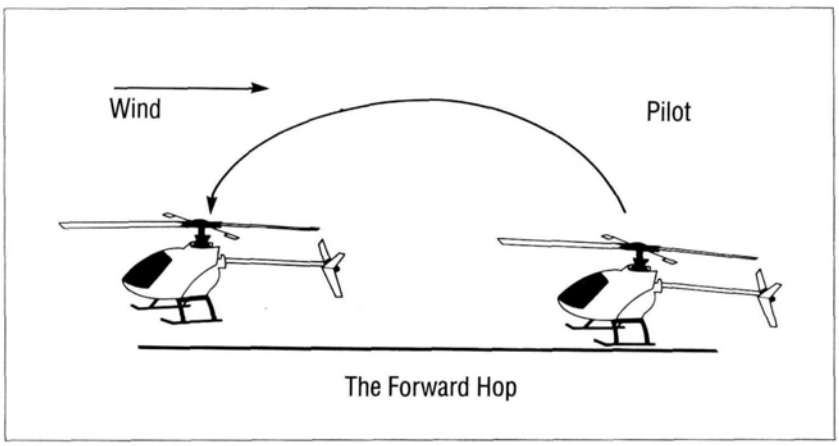
Hobbico's Tim Lampe organized the event with support from *Model Builder Magazine,* Horizon Hobby Distributors, Hobby Dynamics Distributors, Miniature Aircraft USA, Robbe/Schluter, Airtronics and Futaba. The Kyosho Challenge was open to .30-size helicopters with engines up to .35 cubic inches. Flying was in accordance with the AMA rules.



The Hop

maneuvers, which were occasionally difficult, if not impossible to fly smoothly. (Sometime, I'll discuss the FAI class maneuvers and how to fly them.)

This type of event is very good for the hobby. The smaller machines are the most attractive to newcomers, and exposing them to a competition of this type gives them a chance to show that their manufacturers and distributors will benefit us all. This "work-together" attitude was very prevalent during the weekend, and I congratulate these companies—especially Hobbico and Tim Lampe—for making it work.



The Forward Hop

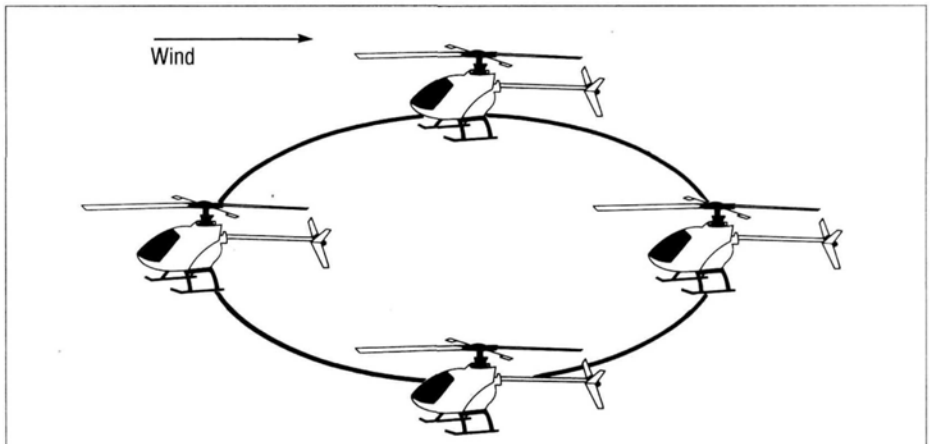
Some of the country's top fliers came to compete with their smaller machines. I judged the flying in the FAI class, and I concluded that .30 helicopters fly almost as well as the larger machines. On both days, the weather was beautiful, apart from gusty winds in the 10 to 20mph range. These were really challenging, especially in the hovering performance levels are up to snuff. This might reduce the amount of scorn that owners of the .60-size helis have directed at them.

The .30 machine, which has emerged as a popular entry-level or training heli, gives newcomers a chance to learn at a considerably lower price. An overall climate of cooperation among the major

FLIGHT SYLLABUS: 10 STEPS TO PILOTING SUCCESS

As promised, I'll now describe the procedure that I recommend as the "only way to fly." The simple, logical, learning steps are designed to move a student quickly from getting the helicopter airborne to hovering and forward flight. The program attempts to prevent the formation of habits that would hinder gaining full control of the helicopter and to allow the pilot to control it in any attitude.

First, what *not* to do. The most common error of new fliers is that they attempt to hover right from the very start. Stationary hovering is very difficult and is actually an *advanced* flight skill. A typical new pilot takes his ship out to the flying



Constant Heading 360

field, gets some help trimming, and then tries to hover. The usual result is that the helicopter tips over, breaks more than a few parts, and the pilot loses precious flying time while it's being repaired. What's even worse is that the repaired machine is subjected to exactly the same treatment. Many give up before they have ever really flown the model.

Another common mistake is that modelers learn to fly a helicopter in one attitude and never learn to control it beyond being able to just lift off and hold it in one spot (assuming the pilot reaches this stage!). This type of flier is petrified if his machine turns sideways or flies in any attitude other than straight, nose out. If you want to learn how to control your helicopter, you need a good plan.

FLIGHT PLAN!

Follow these steps, and you'll be able to head for the flying field with a new goal for every session. Never try to do too much at one time; on the other hand, when you're comfortable with one step, move on to the next.

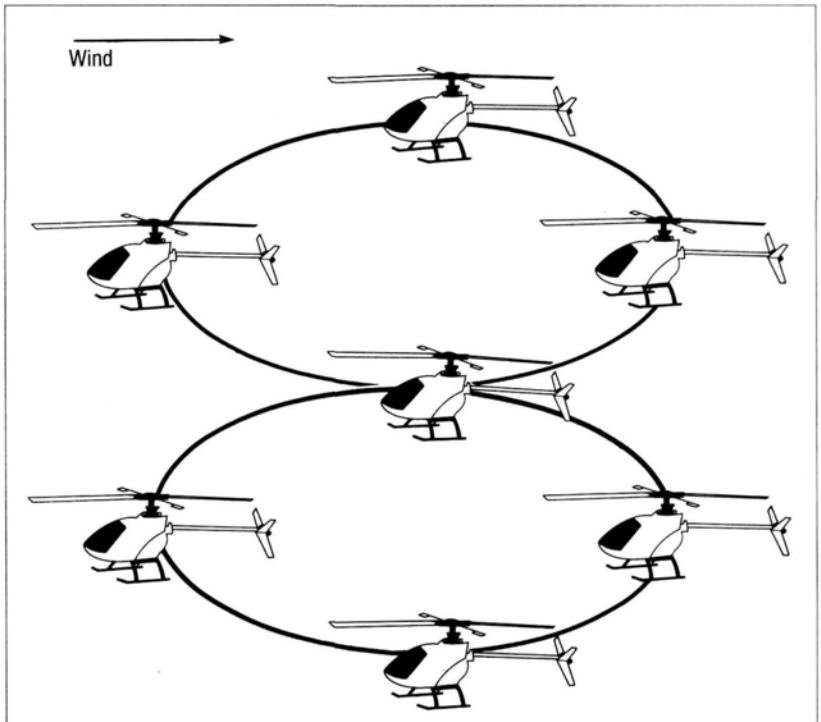
1) The hop. Lift your helicopter off the ground gradually and smoothly to an altitude of about 3 to 6 inches, then gradually and smoothly take it back to the ground. Be sure that its nose is pointed into the wind, and that you're standing behind it (this is known as "tail on").

2) Practice. Practice hopping, gradually increasing altitude until your machine is 18 inches off the ground. Try to achieve a soft landing every time. You're learning how to get out of trouble without panicking. If your model does start to get away from you at any time, you'll now be confident enough to set it down gently. Once again, don't try to hold the helicopter in one spot for any length of time; simply lift off, and then set it back down.

3) Drift. When you hop, you'll notice that your machine has a tendency to drift in any direction. Your next step is to head it forward just after it breaks ground, then to stop the forward motion just before landing. Use a light touch on the controls to avoid over-controlling the model. A helicopter will usually tend to drift backwards as it breaks ground, because wind pushes it back. Counter this by applying slight forward pressure to the fore/aft cyclic control (normally the right control stick on the transmitter, for mode 2 radio systems). To stop the forward drift, pull back slightly on the cyclic control.

Try to time your landings so that the skids touch down just after the helicopter stops moving forward. If you overdo it and the helicopter moves in a direction that's opposite that of the intended flight path, try to counter with the reverse flight control. If you're still in trouble, just set the helicopter on the ground as gen-

(Continued on page 129)



Constant Heading Figure 8

ROBBE BELL 222UT

(Continued from page 97)

inside of the sponsons.

Your finished 222UT will probably be tail-heavy; to ease this problem, move the battery pack into the nose. Construct a platform to hold the pack firmly in place and to reinforce the fiberglass nose area (see photo). Even with a 1200mA pack in the nose, it might still need a little lead to achieve the correct (slightly nose-down) CG. I added 5 ounces of lead to my Lifestar 222UT, and its finished weight is 10 1/2 pounds.

MAINTENANCE

The Junior 50 mechanics in the 222UT fuselage need only a little more maintenance than its pod-and-boom configuration. The rear fan-shroud bolts can't be easily removed unless additional holes are drilled in the fuselage. My Lifestar doesn't have these holes because they aren't scale, so, to remove and clean the fan shroud, I have to remove the mechanics—not too difficult, but a pain. My second 222UT has these extra access holes and fan-shroud removal is easy. A welcome feature of the fuselage is that it takes in less dirt.

FINISHING

As I mentioned before, by taking care during assembly, you could probably get away without painting the fuselage.

If you decide to paint, the instructions call for the use of acrylic enamel paints, and for my 222UTs, I used both K&B* and Hobbypoxy* epoxy paints with excellent results. Vinyl trim sheets make it easy to add numbers and logos.

RETRACTS

When I started to build my first 222UT, I tried to figure out how to install retracts. After considering all the linkage problems, the reliability of operation, extra weight and maintenance, I decided to drop the idea. A 222 with retracts would have been nice, but when entering a scale contest, a 222 with working retracts doesn't earn any more points than a 222UT with fixed gear.

If you're still new to helicopters, or if this is your first scale machine, get the idea of retracts out of your mind. If you can't, remember that the fuselage will need extra support, and *that* means extra weight.

OPTIONAL SKID LANDING GEARS

The supplied landing gear is black, but there are alternatives. For a more scale look, my 222UT Lifestar has 7/32-inch music-wire struts and a Robbe/Heim "T" strut and skid fittings. The supplied 222UT skids with the curved ends of the discarded Junior 50 skids are attached to the rear of the 222UT skids and then painted white. The Bell prototype 222UT

(Continued on page 114)

RACING

RENAISSANCE

RETURN OF R/C GOODYEAR?

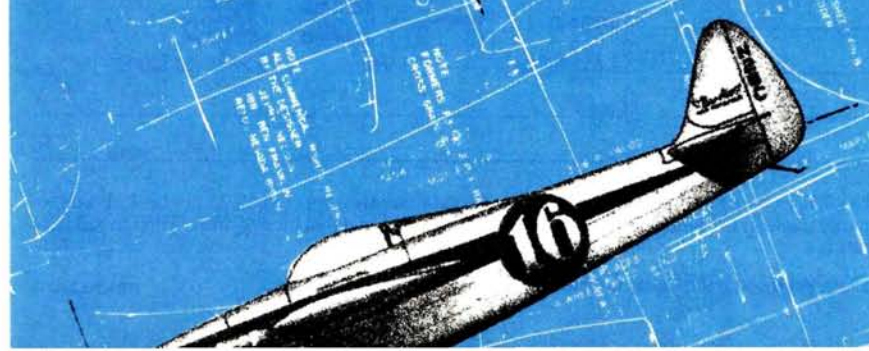
by JERRY NELSON

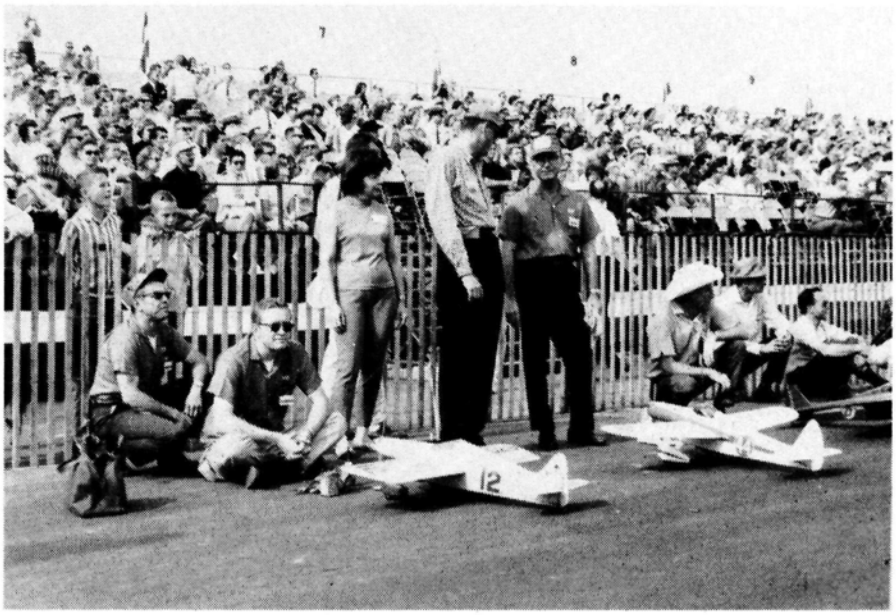
One of R/C racing's originators proposes a new, 4-stroke-powered class

R/C PYLON RACING, or Formula 1, as we now know it, started about 26 years ago. I had the idea for the event when attending one of the early Reno Air Races. The classic Goodyear pylon racers, the Bonzo, Rivets, Cosmic Wind, Old Tiger, La Jollita, etc., were flying in the race, and to me, the time seemed right to duplicate the Goodyear-style of racing with R/C models.

Reliable proportional R/C equipment was available, and we could fly or race on several frequencies. Many modelers were racing against the clock with their AMA pylon racers, but they were looking for more excitement. Where I lived on the West Coast, there was a lot of racing. Members of the Southern California *Fast* club (a former U/C team racing club) were already flying R/C, and there was an excellent range of high-performance 40s that would be perfect for racing.

Circa 1964: our author with his Bonzo design in front of E.E.Stover's full-scale Goodyear racer, "Old Yaller." Could be time to "reinvent" pylon racing for sport fliers.





PHOTOS & ILLUSTRATIONS BY JERRY NELSON

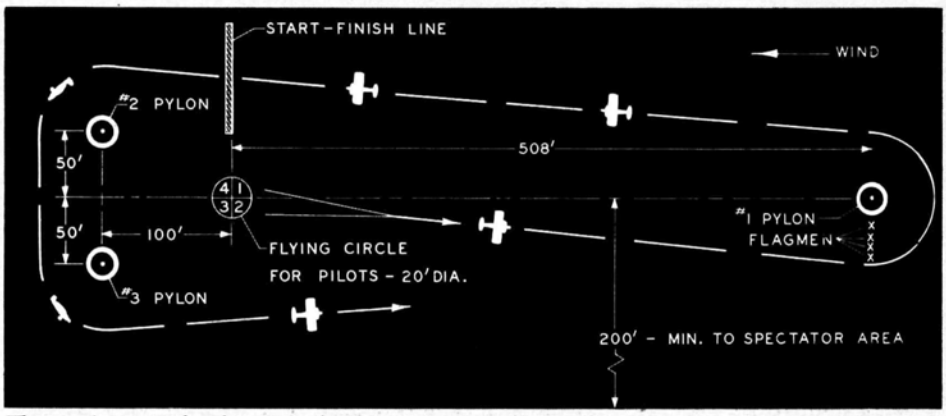
Goodyear Pylon was started by early R/Cers—"names" like (left to right) Cliff Wierick, Jerry Nelson (our author), Edie Downs, Gordon Gabbert, Ray Downs, Bob Dunham, Don Mathis and our own Hal deBolt.

With the help of Joe Martin, Bud Crane and Ed Shipe, I drafted a preliminary set of rules that was published in *Model Airplane News* back in 1965 and sent to modelers all over the country.

I drew a series of three-views of many of the popular full-scale pylon racers and made these available to those who were interested. I then designed several pylon racers with actual construction plans. These included the Cosmic Wind, Shoestring, Rivets, Loving Special, the Little Knarf (non-scale, but allowed in the early version of the rules) and my favorite, the Bonzo.

Then Joe, Bud, Ed and I organized a formal competition to be held at Turlock, CA. I made several trips up and down the West Coast to promote the event and competition, while John Brodbeck of K&B helped with the event's sponsorship by providing a giant trophy. Dick Tichenor promised to write a comprehensive photo article for the model press. With more than 30 entrants, the competition ran smoothly and was a huge success, and the quality of most of the models was excellent. The winner was Joe Martin who flew his own design, DeNight Special, with a reed radio system. *(Editor's note: those of you in the hobby less than 20 years can brush up on reeds by reading Hal DeBolt's "Golden Age of R/C" column.)*

At the time, those of us involved with the "Goodyear Pylon" racing would never have guessed that 26 years later, the event would still be going strong with the same basic rules. There have been very few changes. A model patterned after one of the actual Goodyear racers entered in the first competition would still qualify for current Formula 1 races.



The requirements for the original pylon racing course are still in use today.

PYLON PROBLEMS

So why this article? Why not leave the event alone? If pylon racing is to grow, we must make changes to attract more modelers. I don't suggest that we change the existing Formula 1 because the modelers who now compete are having a great time. Races are held regularly throughout the U.S., and the organizational group—the NMPRA* (National Miniature Pylon Racing Association)—is very professional and holds world-class competitions.

Many share my view that the existing Formula 1 event has too many "too's"—too fast, too dangerous, too difficult to fly, too noisy and engines/props/fuel that are too expensive.

Let's consider the creation of an entirely new racing category and, later on, if interest warrants, a separate organization to handle the organization of the new event. Let's call the class by the original name, "Goodyear Racing."

How can we eliminate or reduce the "too's?" The important idea behind the event must be considered first. In today's Formula 1 racing, the emphasis is on the fastest time, but its real purpose is racing: beating the others across the finish line is the reason for the activity. The amount of horsepower is important, but I think there should be only enough to provide sufficient speed to make the event exciting for competitors and spectators.

The current Formula 1 racers run engines that produce more than 3hp in excess of 25,000rpm. Remember just over 25 years ago: we raced

Working as a team, Bob Violett (on right) and Cliff Telford took more than their fair share of Formula racing honors when they competed. Violett now produces the fastest ducted-fan jets available—200+mph!

with K&B 35s and front-rotor O.S. 40s, and very exciting *races* were the result. We don't need 3hp to fly a racer!

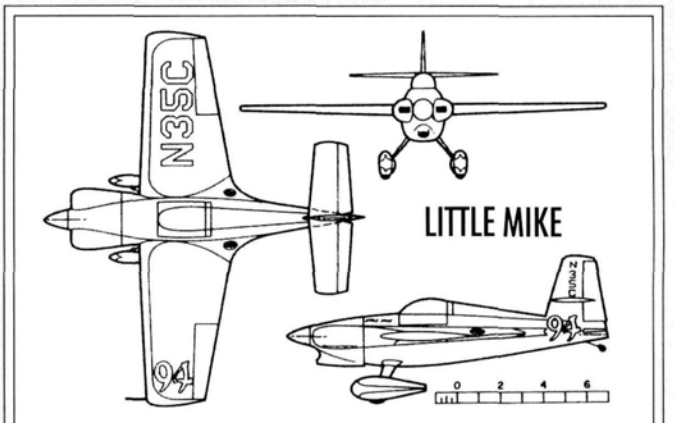
People were always trying to hop-up their engines; always trying to get an edge on the competition. (I don't think that will ever be any different.) Rules requiring stock engines were, and still are, difficult to work with and enforce and—ultimately—counterproductive as far as growth is concerned.

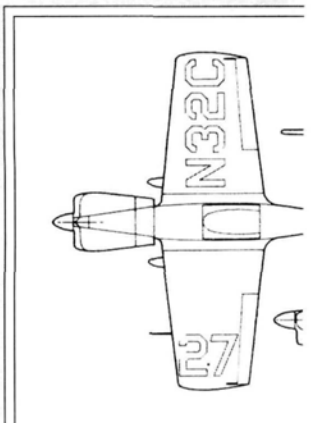
We must come up with an easy way of limiting power so that we can have an event in which the winner is determined mostly by flying skill and aerodynamics. Sure, the engine is important, but let's try to organize events so that you can buy a stock engine and then worry about your model's design and the way in which you race it.

PYLON PROPOSAL

I think I've found a way to do just that. Use a 4-stroke .40 or .50 engine instead of a 2-stroke .40. The 4-stroke should appeal because rpm are naturally limited. The spring-operated overhead intake/exhaust-valve system starts to "float" at around 12,000rpm or so, and the engine just won't turn any faster. The only way to increase horsepower is by increasing the displacement, because 4-strokes are approximately half as efficient as 2-strokes in the power department.

In pattern, a 120 4-stroke has approximately the same power as a 60 2-stroke. With a 4-stroke in your Goodyear racer, you'll have half





Little Mike, formerly Ginny, had a shorter wing, new carburetor, scoop and bubble canopy. I blue and white with gold piping. K. Sorenson was the pilot. ■ Mr. Zip had a green, fiberglass-co fuselage. Paul Schaupp was the builder, and Robert Pflieger, the pilot. Its best speed was 176m

the power of a current Formula 1, but still approximately twice as much as the original K&B 35s and O.S. 40s that were originally used in what was basically the same airplane.

Using the .40 or .50 4-stroke gives many advantages besides the power limit: the engines have excellent throttles, which we need. With the engine idling, landings are much safer and require less skill. Landing is the most difficult part of flying a Formula 1 racer—always dead-stick. Because the racers are streamlined, they glide almost like sailplanes: very flat and quite fast. With an idling engine, propeller-disc drag is significant; so much so that the glide angle is drastically increased, and this makes landing much easier.

With the 4-strokes, there's less engine noise and prop noise. At 25,000rpm, the prop is very loud, but with 4-strokes, the rpm are less than 12,000, so the prop is relatively quiet. Using the muffler supplied with a 4-stroke in combination with the low rpm, it wouldn't be difficult to meet current, or even proposed AMA/FAI noise-level restrictions. Additionally, less noise means more flying fields. The Formula 1 pilots have difficulty finding flying fields with unobstructed landing approaches where their aircraft's noise will be acceptable.

Flying-field operations are much safer with the 4-stroke-equipped Goodyear racer. Its idling characteristics are excellent, and this allows hand-starting, taxiing to the runway, power landing approaches (which allow for an unplanned go-around) and even taxiing back to the pits.

Large-diameter props generate more static thrust and this gives faster, more controlled takeoffs.

There's less stress on the prop and spinner at 12,000rpm than at 25,000 (more safety advantages).

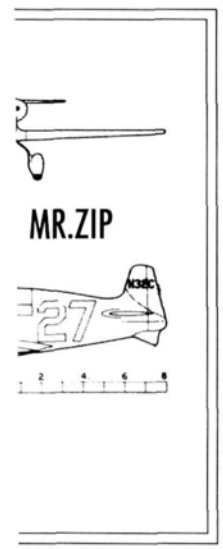
As well as these advantages, we can have our cake and eat it too. The .40 and .50 4-strokes are about the same weight and size as the current Super Tigre and K&B Formula 1 engines, so adapting the 4-stroke to racers you already have isn't difficult.

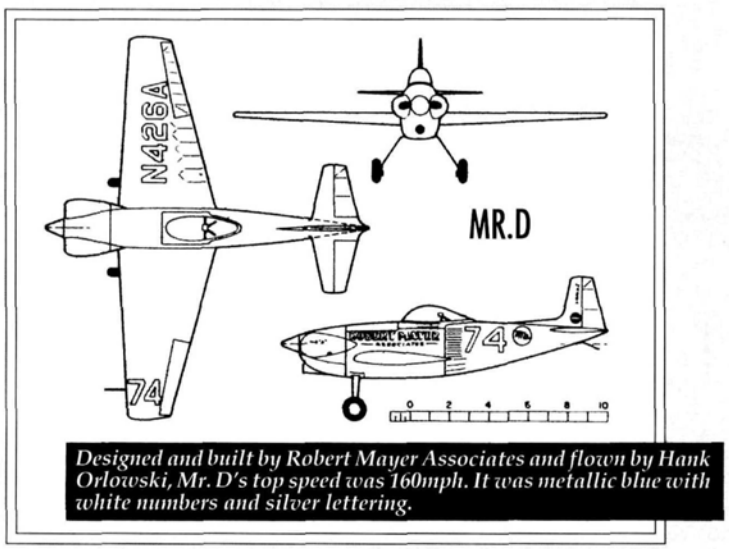
WHAT'S NEXT?

So what do we do with this idea? If you have a pylon racer collecting dust, clean it and install a 4-stroke .40 or .50, then go out and fly it for fun. I'm sure you'll like it. Try making a few pylon turns, then talk to your buddies about the idea—perhaps even build that pylon kit you've had on the shelf for years.

Current Formula 1 types should put a 4-stroke in one of their practice racers, then, with an open mind, evaluate the possibilities of a national class using 4-strokes.

(Continued on page 129)





Designed and built by Robert Mayer Associates and flown by Hank Orlowski, Mr. D's top speed was 160mph. It was metallic blue with white numbers and silver lettering.

SUGGESTED RULES (BASIC) FOR GOODYEAR RACING

1. Engine size: maximum 4-stroke .50 with overhead spring-operated valves. Engine to use standard throttle assembly supplied with engine. (This covers many .45 to .50 engines.)

2. Only one blade of a readily available prop can be modified. (Allows for low-cost standard props and prop balancing for safety.)

3. Wing area 600 square inches with a minimum wing thickness at the root of 1 1/2 inches going to a minimum of 1 inch at tip. (This provides structural strength and good all-around aerobatic and sport performance. Keeps the speed down, too!)

4. Minimum fuselage width of 4 inches and minimum height at pilot head of 8 inches. (This makes a more realistic aircraft.)

5. Minimum main-gear wheel size to be 2 1/2 inches (diameter) by 3/4 inch (width). (This allows for rough field, grass or dirt, takeoff and landings.)

6. Minimum weight: 5 pounds. (Special construction techniques and equipment aren't required to keep to this weight.)

7. During landing approach, engine must be idling until main wheels touch ground. If engine quits while in flight, one placing position will be deducted for that heat race. If the aircraft placed 1st and the engine failed, it would be placed 2nd for that heat race.

8. Takeoff position for heat races to be determined by 75-percent scale outline and 25-percent workmanship. (Realistic aircraft will have a takeoff advantage. Less emphasis on outstanding finishes, which many modelers can't do.)

9. Most of the non-conflicting Formula 1 rules apply.

CLASSIFIED

Send ad and payment to *Model Airplane News*, 251 Danbury Rd., Wilton, CT 06897. **Non-Commercial classified ads** (commercial ads of any kind not accepted at this special rate). Rate: 15 words or less, $4.50 payable in advance. No charge for name and address. Additional words, 25¢ each. **Commercial classified ads** (rate applies to anyone selling on a commercial basis–retailers, manufacturers, etc.) Rate: 50¢ per word, payable in advance. Count all initials, numbers, name, address, city and state, zip and phone number. **Closing Date** for either type of ad is the 20th of the third preceding month (for example, January 20th for the April issue.) We do not furnish box numbers. If you would like your ad run in more than one issue, multiply amount of payment by number of months that ad is to run. It is not our policy to send sample copies of tear sheets.

WANTED: Model airplane engines and model race cars made before 1950. Jim Clem, 1201 E. 10, P.O. Box 524, Sand Springs, OK 74063; (918) 245-3649.

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ANTIQUE IGNITION AND GLOW PARTS CATALOG: 100 pgs., timers, needle valves, original cylinder heads, point sets, drive washers, stacks, spark plugs, plans. Engines: Atwoods, Baby Cyclones, McCoys, Hornets, others. $8 postpaid U.S., Foreign $20. Chris Rossbach, R.D. 1 Queensboro Manor, Box 390, Gloversville, NY 12078.

WANTED: RTF U/C planes and U/C race cars, mite cars; complete or pieces, with or without engines. Buy or trade. John Fietze, Box 1521, Amagansett, NY 11930.

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ROBBE BELL 222UT

(Continued from page 107)

uses Robbe/Heim flexible white struts and the stock 222UT skids painted white, and it's quite scale-looking.

FLYING

The Schluter Junior 50 is an amazingly peppy helicopter. What happens when you add 2 extra pounds of fuselage? As you might imagine, response is slower: it won't jump when you punch the throttle/collective stick, and you can expect a slower recovery. Recoveries during descents must be planned, and the continual use of idle-up ensures that the head speed is maintained.

My 222UT Lifestar uses a Webra* .50 with a pro-mix carburetor. Hovering is accomplished with about 4 1/2 degrees of blade pitch and about 5/8 throttle, and head speed is approximately 1,900 to 2,100rpm. Although this 222UT Webra combination is slightly sluggish when compared with my pod-and-boom Webra, it's an outstanding performer.

The fuselage of the Bell prototype 222UT was heavier than the first—probably owing to more resin and/or heavier gelcoat. Its finished weight is 10 3/4 pounds, and it's powered by a moderately used Enya*. The pitch settings are the same as those on the Lifestar, but the throttle setting needed for hover is about 3/4 open. Punching the T/C gives *r-e-a-l-l-y s-l-o-w* response. Once into forward flight, though, this 222UT flies really well. I suggest a newly broken-in engine.

Aerobatics aside, when you're used to the 222UT's extra weight, flying it isn't much different from flying the standard Junior 50, and the increased visibility of its fuselage is a definite plus.

While building both 222UTs, I was continually impressed by the accuracy of engineering. Allow enough time to gain a thorough understanding of the techniques required for assembly, set-up and finishing, and there's no way you could be disappointed with the completed kit.

**Here are the addresses of the companies mentioned in this article:*

Schluter; *distributed by Robbe Model Sport, 180 Township Line Rd., Belle Mead, NJ 08502.*

PIC, *943 N. Shoreline Blvd., Mountain View, CA 94043.*

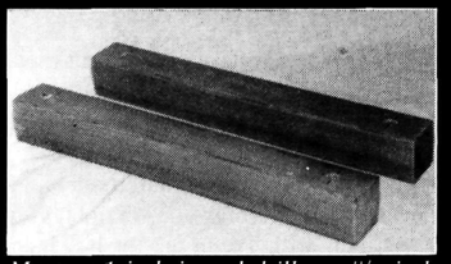
Futaba Corp. of America, *4 Studebaker, Irvine, CA 92718.*

K&B Manufacturing, *12152 Woodruff Ave., Downey, CA 90241.*

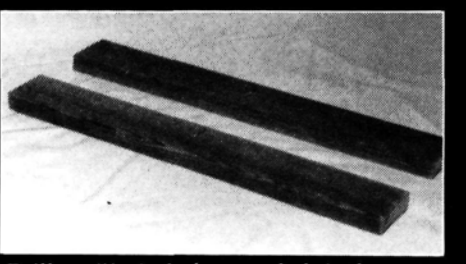
Hobbypoxy/Pettit Paint Co., *36 Pine St., Rockaway, NJ 07866.*

Webra; *distributed by United Model Distributors, 301 Holbrook Dr., Wheeling, IL 60411.*

Enya Model Engines/Altech Marketing, *P.O. Box 286, Fords, NJ 08863.* ■



Measure 1 inch in and drill one 11/64-inch clearance hole in each end of block 2. Using a 3/16-inch drill, countersink the holes 1/2 inch.



Drill one 11/64-inch clearance hole in the center of each block.

For each block set, lay block 3 over block 2, mark the location of the hole, and drill a starter hole in block 2.

by LEE KUFCHAK

BUILD A

WING JIG FOR LESS THAN $5!

Straight wings provide the best performance. Here's how to build 'em that way!

WHETHER SCRATCH-BUILDING or building from a kit, it isn't easy to build a straight wing, and a wing jig really helps. I've been using the one described here for more than 15 years, and it's as accurate and easy to use today as when I first made it.

Although my workbench is made of 3/4-inch plywood, over time, it might have sagged or warped without my noticing, so, to ensure that the jig is as straight as possible, I attached the jig blocks to a piece of pressboard shelving. This means that I can move the jig, with the wing attached, off my workbench when I want to set it aside (even on end). I can then work on another project while the wing glue is setting.

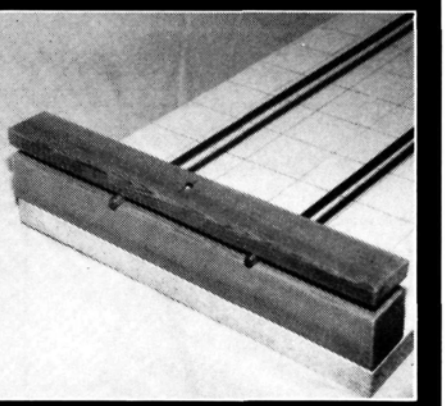
You'll need the following parts to assemble your jig:

1. Two 36-inch-long, 1/4-inch-diameter steel rods (drill rod is best, but music wire also works well); cost, approximately $3.25.
2. Two 12-inch lengths of 1 1/2-inch-square wood (pine or fir).
3. Two 12-inch lengths of wood (pine or fir), approximately 1/2 inch thick and 1 1/2 inches wide.
4. Four no. 8 by 1 1/2-inch round-head wood screws.
5. Two no. 8 by 1 1/4 inch round-head wood screws.
6. One 36-inch length of 1x12-inch *straight* particle-board shelving; cost, approximately $1.25.

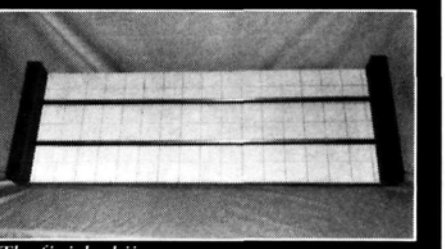
Cut the wooden blocks (nos. 2 and 3) out of a knot-free piece of 2x4 using a hand-operated circular saw with a rip fence. Measure each (2) to ensure their sides are parallel. If you don't have a saw, your local lumber yard can supply you with stock of the right dimensions that you can cut to length. Don't buy wood that's less than 1 1/2 inches square for block 2. You'll need the clearance under the wing ribs when you use the jig.

Before assembling your jig, paint the top of the particle board white. Using a permanent-ink pen, draw reference lines in a 2-inch grid. Take care to make *absolutely* sure the lines are square. These grid lines will be useful when you're assembling a wing.

Place one block 2 at the end of the particle board, then mark and drill two 7/64-inch pilot holes in the board. Using two screws (4), attach the block to the particle board. Repeat for the other block.



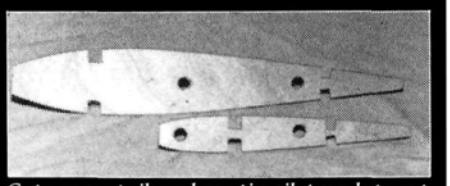
Set the two rods (1) on the assembly, then, using one screw (5) each, attach block 3 to block 2. Tighten just enough to clamp the rods between the blocks.



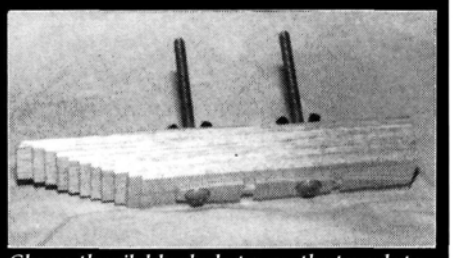
The finished jig.

PHOTOS BY LEE KUFCHAK

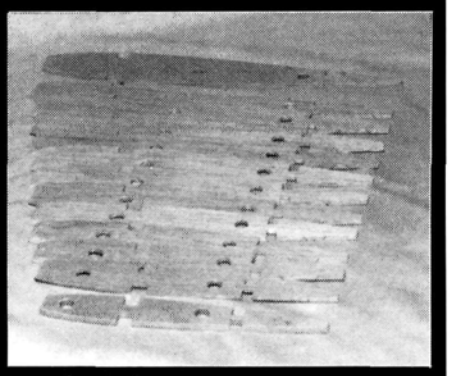
WING JIG



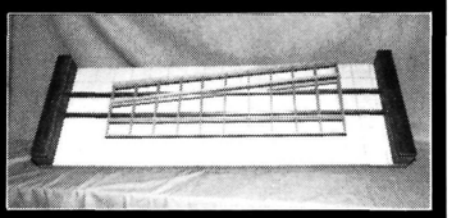
Cut one root rib and one tip-rib template out of plywood.



Clamp the rib blanks between the templates with bolts, then sand the rib blanks to match the templates. Cut openings for the spars as necessary.



Completed ribs.



Slide the ribs onto the rods, line up, and tighten upper blocks. Add the leading edge, trailing edge, and spars. After checking everything for alignment, glue into place. Add landing-gear blocks and sheeting, and your wing half is finished.

JIG USE

With your new wing jig assembled, the next step is to use it. Whether you're scratch-building or building from a kit, you use the jig in the same way. Drill two 1/4-inch holes in each rib, slide the ribs onto the steel rods, then clamp the rods onto the jig by tightening the upper blocks. This holds the ribs perfectly square so that you can completely assemble the wing and add top and bottom sheeting without worrying about warping.

If you're scratch-building, cut root and tip rib templates from 1/8-inch plywood. Draw a center line on the ribs, then carefully drill two 1/4-inch holes in the templates. If you have a small model and are using 3/16-inch rods, you obviously use a 3/16-inch drill. Try to put the holes where they won't weaken the structure of the wing. I usually put one hole between the leading edge and spar, and the other approximately a quarter of the chord's width ahead of the trailing edge. Be sure the holes are the same distance apart on both the tip and root rib. This makes it easier to slide the finished ribs onto the rods.

Cut enough 3/32-inch balsa blanks for one wing half, then lay one template over each blank and drill two holes to match the jig holes in the template. Use a sharpened piece of brass tube to drill holes in the rib blanks. Clamp the templates and ribs together with 1/4-inch bolts (or 3/16-inch bolts for 3/16-inch rods) and sand the balsa ribs to the shape of the templates. Repeat this for the other wing, and you now have enough ribs.

If you are building a tapered wing as shown in the photos, you'll have to touch up the finished ribs with sandpaper to remove the sharp edge from the leading edge and sides of the ribs.

When building from a kit, clamp the ribs together and drill two holes for the rods as described. To ensure alignment on the jig, be sure the holes are in the same place on each rib.

Slide enough ribs for one half of the wing onto the steel rods, line up the rods with one of the reference lines on the particle board, then tighten the upper blocks. Mark the rib locations on the wing's leading and trailing edges, and pin or clamp them into place. Sight the ribs to ensure they're aligned with the reference lines, then glue the assembly together. Add leading-edge and trailing-edge sheeting as required. Don't add the center-section wing sheeting until after the wing has been joined and the dihedral braces are in place.

To work on the other side of the wing, loosen the upper blocks and turn them so that the rods can clear the blocks. Keeping the rods in the wing, turn the wing over, then tighten the upper blocks again. This way, you can work on both sides of the wing (even apply sheeting) without waiting for the glue to set.

Repeat for the other wing panel, and you've finished. Now you've built the jig and a warp-free wing; you'll probably never again build in any other way! ■

BUILD A

Dual-Rate Ni-Cd Charger

Standard pack or larger pack—this inexpensive project will handle them both!

by PETER CARR

UNTIL recently, average 500mA airborne battery packs would last for six or more flights and still have plenty of power left. Then came servo-mixing, which required a servo at each aileron and sometimes one for each flap. Running all these little motors quickly eats up the available battery capacity.

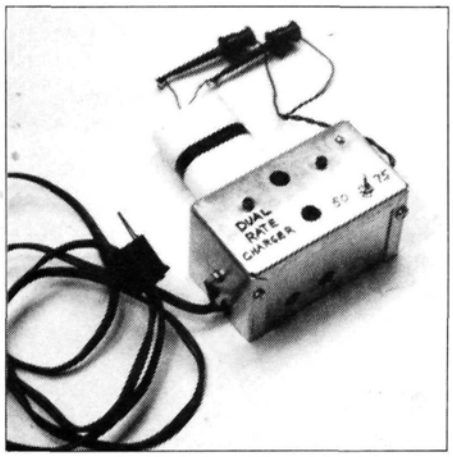
To handle the increased drain and to put some useful weight in my plane's nose, I switched to an SR battery pack rated at 900mA. It's nearly the same shape and size as a 500mA pack, yet it's 30 percent heavier. It works well and gives the full charge of the old setup. The problem?—I didn't have a charger that would handle the C-10 rate of 90mA.

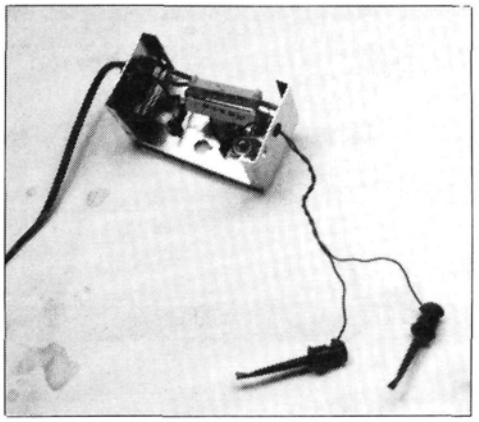
CONSIDERATIONS

Manufacturers usually recommend that you charge battery packs at 10 percent of their rated capacity. If you drain a 900mA pack down to 1.1 volts per cell, for example, it should be recharged for 10 hours at 90mA. This is called the C-10 rate (or slow-charge rate), and it will keep the cell's internal temperature down. Higher rates can warp a cell's inner parts, vent material and corrode the terminals. If you used a 50mA charger on a 900mA pack, it would take about 16 hours to reach a full charge.

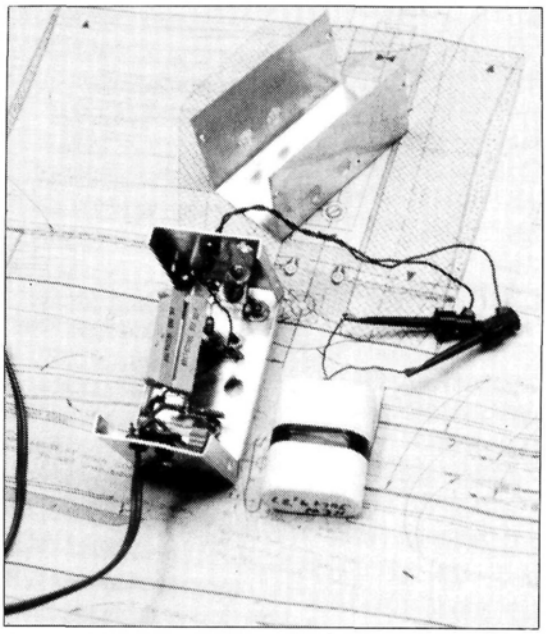
I have several airborne units that are controlled by a single transmitter, so at contests, I need to charge several planes at once. My charger must be able to charge regular 500mA packs, as well as bigger ones. To match the proper C-10 rate, a switch and a secondary circuit select one of two outputs.

Most chargers have dual output for receiver and transmitter charging. Because I needed only one output at a time, I eliminated the usual power transformer and thus saved money. Because the charger is direct-coupled to the AC line, I added a 1.5A fuse as a safety measure.





•Above: The charger with the cover installed. Easy to build and inexpensive, it's a worthwhile addition to your equipment. •Right: You could replace the charge leads shown here with a connector that can be mated with your battery pack, or make adapters to suit all your radios.



You could replace the charge leads shown here with a connector that can be mated with your battery pack, or make adapters to suit all your radios.

HOW TO MAKE A DUAL-RATE CHARGER

Construction is very easy. First, mount the two terminal strips inside the aluminum minibox, leaving enough space between them for the two sand resistors. Next, mount the fuse holder, the rate-select switch and the lamp holder. Drill holes near the fuse for the AC power cord, a hole near the lamp for the output wires, and two 1/4-inch holes in the box below the two resistors. To protect the wires from being cut by the holes' sharp edges, install rubber grommets. Strip the ends of the AC power cord and push it through the hole near the fuse. Tie a knot in the cord, and solder the ends to the fuse holder and the input terminal strip. The knot will relieve the strain on the connections.

Solder the 1N4818 diode between the terminal and the lamp's contact. (Use either contact; the lamp isn't polarized.) Install the two sand resistors from the input terminal strip to the rate-select switch. A short length of wire connects the switch's center contact to the center terminal of the output terminal strip and the diode. Hook the black and red lengths of no. 22 stranded wire to the lamp output and fuse holder, respectively. These wires can be connected to a male plug that's

(Continued on page 120)

HINTS & HELO-ESE

(Continued from page 102)

bly, understanding set-up principles, routinely inspecting and maintaining your heli, cycling and charging your batteries, and preparing for possible crashes and field repairs are all vital.

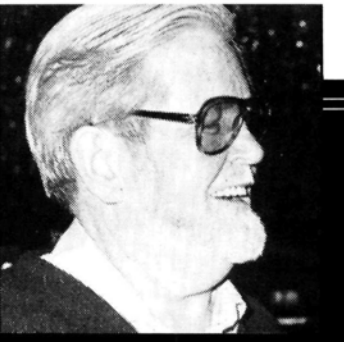
13. The "three strikes"—that's what I call unfavorable sun, unfavorable wind and unfamiliar maneuver. Don't ever try to take on all three at the same time. If you're trying something new, make sure the wind *and* the light are on your side. An unfavorable wind speed is easy to identify, but beware of crosswinds or quartering winds that can ruin your maneuvers' entries and exits. Decide whether you want to start a maneuver going downwind or upwind, and *know*—don't guess!—whether you'll come out of the maneuver *with* the wind (faster), or *against* it (safer).

Most intermediate fliers run into trouble by trying their first aerobatics in bad light. Please, for your first loops or rolls, make sure there's nothing but blue sky behind your helicopter. The sun should be behind you—avoid midday—and the shadows should be in front of you. Further, don't try new maneuvers on overcast days (no shadows), or after sunset, because doing loops and rolls puts your helicopter at an altitude where it's difficult to see, even on a sunny day.

14. Here's more on the third strike: "unfamiliar maneuver." Every maneuver is at least two maneuvers because you can do it left-to-right or right-to-left. If you've practiced one way and are good at it, but you haven't given the other way equal time, then the other way—your weak direction—definitely qualifies as an unfamiliar maneuver.

You may go out on the field to practice rolls: the sun is behind you (OK); the wind is at 4 knots, left to right (OK), but you've only done rolls upwind and left to right. You must now choose between the unfamiliar wind heading (downwind) with the familiar flight path, or the familiar wind heading (upwind) with the unfamiliar (right to left) flight path.

If you walk to the other side of the field to correct the wind direction relative to your better way of flying a roll, then the sun will be in your eyes. Faced with this dilemma, tackle the unfavorable wind direction first. In other words, fly the maneuver in the direction in which you're most confident (in this case, left-to-right). Your goal for the day should be to fly the maneuver on a new wind heading, and don't mess with the sun unless absolutely necessary.



WALTER L. SCHRODER

SADLY, I REPORT the passing of Walt Schroder. Walt was once the editor of MAN, and he did the job longer than anyone else has, or is ever likely to. He was the one who gave me my first "break" with the magazine by offering me a kit for my first "Field & Bench Review," and I know he helped many others. When MAN co-sponsored the Tournament of Champions, he invited me to take my just-finished 1/5-scale Messerschmitt Bf-109 to Vegas for demos. I couldn't accept, but I was greatly flattered by his invitation.

Walt guided Model Airplane News through some difficult times, and he contributed immensely to its longevity. We all owe a lot to him so, later this year, during the biggest Tournament of Champions ever, please take a moment think of Walt. This one should be called "The Walt Schroder Memorial Tournament of Champions."

RAU

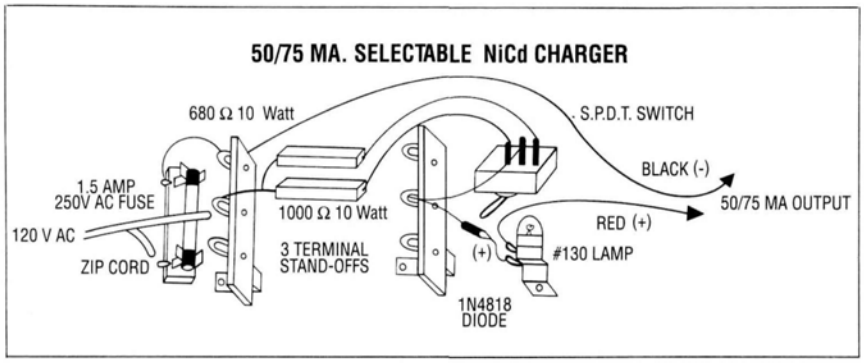
15. It will happen to you: your machine sounds great and is flying beautifully; you have the whole field to yourself; you just did your best-ever coordinated turn; and you're making an in-run setting up to try to do a stall turn better than the one you did last week. You have good air speed, pull up, and...Godzilla puts you into a headlock! That's what it feels like, but all that really happened was that a spectator tapped you on the shoulder to ask you how much your helicopter cost. You were so startled you didn't even notice that his dog was biting your frequency flag.

Practice dealing with this situation by asking someone to sneak up on you while you're flying and try to distract you. After you've been taken by surprise a few times, you'll learn to fly the heli away from and to walk away from the disturbance. Better yet, you'll learn to anticipate distractions by momentarily glancing away from your flying machine occasionally to check to your left and right (just as a good car driver uses his side-view and rear-view mirrors).

16. After a bad crash, clean off the dirt and unbolt the broken parts as soon as possible, preferably at the field.

(Continued on page 129)

DUAL-RATE NI-CD CHARGER



Parts List

1 AC power plug for zip-cord.
5-foot AC power cord (zip-cord).
1, 1.5-amp glass radio fuse.
1 fuse holder.
2, three-contact terminal strips.
1, 680-ohm, 10W power sand resistor
1, 1,000-ohm 10W power sand resistor
1, single-pole, double-throw switch.
2 rubber grommets for 1/4-inch holes.
1, 1N4818 diode.
1 no. 130 lamp.
1 lamp holder
24 inches of no. 22 red wire.
24 inches of no. 22 black wire.
1 connector plug for your radio system.
1, 4x2 1/4x2 1/4-inch aluminum minibox.

Most parts are available from Radio Shack. The sand resistors and the lamp are available from your local electrical/electronics supply store.

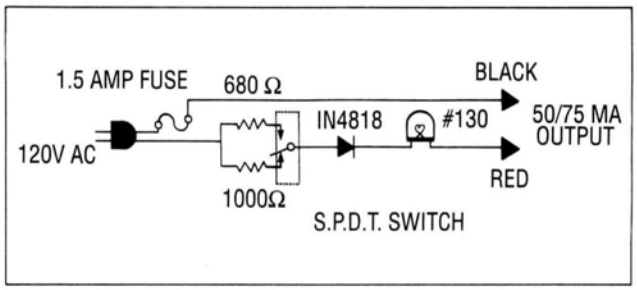
compatible with your radio's charge jack, or to alligator or instrument clips. I used instrument clips so that the charger could be mated with the Deans, Futaba and Kraft connectors on my planes. After you've installed an AC plug on the power cord, the charger is ready for testing.

Before putting power to the unit, check all the connections, then install the fuse in its holder. Double-check the polarity of the output wires to the battery pack, and place the rate-select switch in the correct position for the battery you've connected. Place the charger (without its lid) on a non-metallic surface, hook up the battery, and plug in the AC cord. The lamp should glow at about half brightness, and one of the sand resistors should start to get warm.

Let the charger operate for approximately 30 minutes, and check its temperature. It should feel warm, but not hot. Unplug the charger from the AC and install the lid. The holes you drilled in the case help to promote the airflow around the resistors. They also allow you to see the lamp and to determine whether the charger is actually charging. Because the lamp is in series with the battery, it must light for current to reach the battery. Remember: no glow, no charge!

As you switch the charge rate from the 50 to the 75mA position, the lamp's brightness will change. This shows that both sides of the circuit are operating normally. It also saves you the cost of a current meter, and you can easily see it in the dark.

50/75 MA SELECTABLE NiCd CHARGER SCHEMATIC



You can expect to charge your 500mA packs in about 10 hours—the same as with a factory charger. For 900mA packs, charging will take approximately 12 hours. (It's possible to change the sand-resistor value for 90mA rate, but I didn't have one of that value in my junk box.) On a contest day, you have only about 45 minutes of operating time, so the packs are hardly discharged, but for sport flying sessions in which you "speck out" several times, I recommend the full 12 hours!

I used a black pen to inscribe the case and mark the two current rates next to the switch. I also taped an extra no. 130 lamp inside the case, and I used a lamp holder. If the original lamp burns out, the spare can be installed easily without soldering.

This charger not only feeds batteries a steady diet of the right amount of current, but it also makes a great hand-warmer! ■

CLUB OF THE MONTH

ORAF

ROSWELL AIR FORCE R/C FLYING CLUB
180 Ludwell Ct. Alpharetta, GA.

Bill Weeks of Alpharetta, GA, is the editor of the Roswell Air Force R/C Flying Club's newsletter, which includes some interesting photos. In one, a man is climbing a large tree that has a plane lodged at its top. Another shows half a tree. A plane flew through this one, sheared off some of the branches, and in the process, lost its wings. The more down-to-earth photos include Harry Schremp's blue-and-yellow modified Model Tech Bullet, which he calls the "Blankety Blank." (Wonder why?) Russell Titus must have spent a lot of time on his 1/4-scale Cub, which he covered in Solar Tex and painted with Cub Yellow dope. Ready to drive off for a day of serious flying, Tom Chauffeur's dog Blondie is shown sitting behind the wheel of a car with an R/C plane next to her. Maybe Blondie is trained to retrieve plane parts that fall from trees.

The club has some poets, too: "I think that I shall never see a hungrier bunch of plane-eating trees"; some men of wisdom: "You only get in trouble when you cut or glue"; and some men with unusual dress codes who "must be trying to imitate the new punk style of dress by cutting holes in their clothes with running props." Interesting group!

Bob Phelps was written up in the member-profile column. He has built 25 planes in 6 years and six are still flying. (He preferred not to talk about the other 19.) He buys backup kits for his favorite planes, and he now has three favorites and three kits in reserve.

Like all good newsletters, safe flying practices were discussed and suggestions were offered. Also mentioned was the problem with flight boxes. "With 21 channels available and only four flight boxes, it's easier to get a channel than a flight box." One solution is to use the four standby slots at the bottom of the frequency board to reserve a place in line for a particular box. Here's another good suggestion: "Keep it simple. This hobby is supposed to be fun, and I hate to see it get bogged down with excessive rules and regulations. Any system we use will depend on courtesy and common sense to work."

Congratulations, Roswell Air Force Flying Club. We're sending you two free subscriptions. Give one to the guy in the tree.

PRODUCT NEWS

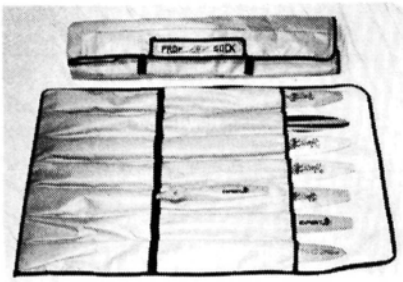
Descriptions of new products appearing in these pages were derived from press releases by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Model Airplane News,** or guarantee product performance. When writing to the manufacturer about any product described here, be sure to mention that you read about it in **Model Airplane News.**

AIRBORNE HOBBIES
Z-Best Engine Cleaner

Z-Best Engine Cleaner's high-tech formula removes the encrusted carbon build-up from R/C engines—it's guaranteed! Find the oldest, dirtiest engine you can, brush on a coat of Z-Best Engine Cleaner, and let it stand for 1 hour. Rinse with water, and use a toothbrush to reach between the head fins. Your clean engine will run cooler and last longer!

Price: $6.95/4-ounce can (enough for 15 or more engines)

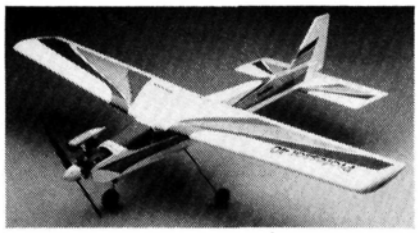
For more information, contact Airborne Hobbies, 3764 30th St., San Diego, CA 92104.



MODEL AVIATION PRODUCTS
Prop Sock

Model Aviation Products proudly introduces a product for fliers of 1/4-scale aircraft—the Prop Sock, which has seven tubes to protect and transport props from 11 to 25 inches long. A 6-inch flap folds over the tips, and the whole thing rolls up and is secured by two Velcro hold-downs. The unit is light, sturdy, durable and easy to keep clean. No longer will your big, expensive props bang against one another in a box, or be damaged in transport. Available soon in selected shops, or order direct.

For more information, contact Model Aviation Products, P.O. Box 26017, San Bernardino, CA 92406.

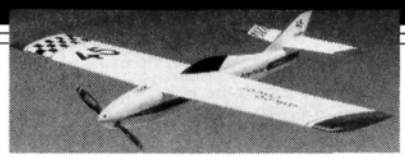


FUTABA
Professor 40/ARF Trainer

Futaba's Professor 40 is the perfect trainer. Its predictable flying will suit beginners (and experienced fliers, too), and its wing is designed for excellent low-speed, landing and stall characteristics. Designed for quick construction and durability, the Professor 40 uses advanced ARF techniques. For extra strength and easy repairs, the wing is molded of special lightweight foam; the pre-built sections (e.g., the fuselage) are handcrafted on precision jigs to ensure perfect alignment; and the elevator, aileron and rudder are pre-hinged. Wooden parts, like the bulkhead and servo tray, are pre-cut for an exact fit.

The Professor 40 is over 90 percent pre-constructed, and everything except glue, a radio, an engine and engine accessories are included in the kit. To help you put it all together, Futaba provides a well-illustrated, step-by-step instruction manual. Length: 41 inches; Wingspan: 59 inches; Wing Area: 540 square inches; Weight: 5 1/4 pounds; Engine: .40 to .45 (2 cycle)/.60 (4 cycle); Radio: 4-channel.

For more information, contact Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

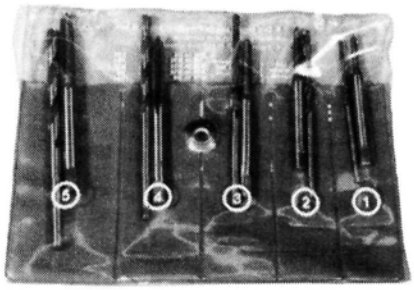


ROBBE
Micro Racer

Specially designed for electric pylon races, the Micro Racer brings excitement to electric flight! This plane is fast and precisely follows every command, so it requires an experienced pilot with good eye-to-hand coordination. The all-wood kit includes die-cut and pre-cut wooden components, R/C hardware, a 540S electric motor, propeller, prop adapter and spinner. With the optional Keller 22/5 or 22/9 motor, the Micro Racer might be the hottest electric you'll ever fly! A 3-channel radio and a 7-cell Ni-Cd battery are recommended. Wingspan: 32.8 inches; length: 27 inches.

Part no. 3199

For more information, contact Robbe Model Sport, 180 Township Line Rd., Belle Mead, NJ 08502.



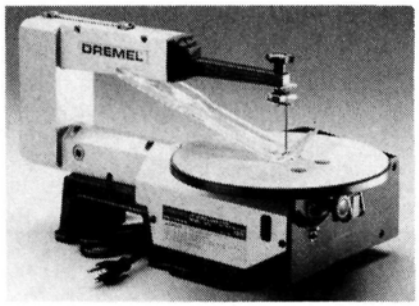
ACE R/C
Drill/Tap Set

Tired of trying to find the right drill/tap combination? Ace has solved the problem; they match the right-size bit and tap *for you!* Neatly packaged in a handy pouch, each set contains a 2-56, 4-40, 6-32, 8-32 and 10-32 tap and the appropriate drill for each. Made of high-speed steel for long use.

Part no. 37K170

Price: $10.98

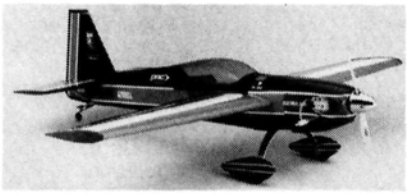
For more information, contact Ace R/C, 116 W. 19th St., P.O. Box 511, Higginsville, MO 64037.



DREMEL
13-Inch Scroll Saw

The new 1371 13-inch Scroll Saw is the latest in Dremel's distinctive line of bench-top power tools. Modeled after its 16-inch Heavy-Duty Scroll Saw, the 1371 has a die-cast aluminum frame, a cast-iron base and a round table. It uses a 0.9-amp, induction, direct-drive motor to produce 1720rpm, and its 5-inch pin and plain-end blades can be mounted for front or side cutting. Other features include a clear-plastic blade guard, front-mounted blade-tension control, and an adjustable, 10-inch-diameter steel table that pivots from 0 to 45 degrees and locks into position for accurate bevel cuts. A convenient built-in tray holds spare blades, and the on/off rocker switch is lockable and dust-resistant. Available in hardware stores.

For more information, contact Dremel, 4915 21st St., Racine, WI 53406.



HOBBICO
Extra 300

Hobbico announces the Extra 300—a model of the full-scale German plane that's carefully detailed right down to the simulated rivets! The Extra 300 offers aerobatic performance for intermediate or experienced fliers. Hobbico's ASAP series gets you in the air as soon as possible. Included are a chrome spinner, plastic canopy and scale landing gear. Wingspan: 53.75 inches; engine: .40 to .46 2-stroke, .70 to .91 4-stroke; channels: 4; material (wing/fuselage): foam-covered balsa and ply.

Part no. HCAA2600
Price: $259.95

For more information, contact Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

GLOBAL HOBBY DISTRIBUTORS
Excell Series: PCM or FM, 7 Ch.

For R/C flying in 1991 and beyond, Cirrus RC Systems announces its newest narrow-band systems—the Excell series! The Excell-7 FM and PCM transmitters feature: 7-channel versatility with 7-channel servo-reversing; aileron and elevator dual rates; coupled aileron/rudder mixing; flap/throttle mixing; flaperon mixing; vari-trim throttle; expanded-scale voltmeter; and a custom microprocessor.

The FM and PCM receivers feature: a dual-conversion, narrow-band design with both ceramic and crystal IF filters, multiple-IC design, solderless connectors, surface-mount construction and failsafe (PCM only). All Excell-7 systems include four CS-248 standard servos, a switch harness, full Ni-Cds with charger and complete accessory hardware.

For more information, contact Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728.

HOBBY DYNAMICS
Gobee 40 and Gobee 20

Here are two, great, new, intermediate trainers—the Gobee 40 and the Gobee 20! Designed for durability, the Gobees are easy to build and can practically fly themselves! Using the technical wizardry of Computer Aided Design (CAD), the planes were designed to provide awesome flight capabilities and stable flight characteristics at a wide variety of speeds, and this results in unmatched performance. These kits come with assembly manuals, mechanical drawings and all the necessary hardware, and they can be easily assembled in just 18 hours!

For more information, contact Hobby Dynamics, 4105 Fieldstone, Champaign, IL 61821.

WORLD ENGINES
Pro-Charge Dual Multi Charger

The Pro-Charge Dual Multi Charger will slow-charge two battery packs simultaneously. The two charging circuits are independent and have separate current adjustments; there's a charging-current limiter; and both battery terminals are protected from reverse-polarity installation. The charger has a durable aluminum case, and its meters are easy to read. A voltmeter can be used with it. Specifications: size, 7x5.5x3 inches; power input, 110V AC (standard house current); charging capacity, 1 to 12 cells; 5-year limited warranty.

Part no. 10945
Price: $109.95

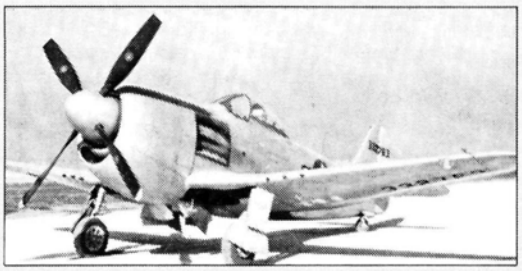
For more information, contact World Engines, Inc., 8960 Rossash Rd., Cincinnati, Ohio 45236.

NAME THAT PLANE

CAN YOU IDENTIFY THIS AIRCRAFT?

If so, send your answer to Model Airplane News, **Name the Plane Contest** (state issue in which plane appeared), 251 Danbury Rd., Wilton, CT 06897.

Congratulations to Allen W. Hayes of Alexandria, MN, for correctly identifying the Curtiss YP-60E fighter shown in our July '90 issue! His entry was drawn from the 58 correct ones we received: our readers seem to be studying more lately! Many of you answered "YP-60," but we couldn't give you credit because you omitted the "E"-model designation; in this case, it was important, because the designation had already been through four iterations.



Although the YP-60 series were designed as improved versions of the P-40, the YP-60E bore little resemblance to the Warhawk. The in-line Allison was replaced by a massive, round P&W R-2800, and this converted the P-40's graceful lines to a chunkier P-47-like shape. The birdcage-style sliding canopy gave way to the latest innovation designed to improve the fighter pilots' field of vision—the bubble, and the retracts retracted inboard rather than rotating 90 degrees and going aft.

Only two YP-60Es were built, and they had 41½-foot wingspans and weighed over 10,000 pounds. The first one flew on May 26, 1943 and achieved a speed of 410mph. The plane was severely damaged soon afterward, and the program was scrapped when it became clear that the expected performance couldn't be realized.

The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail), and will receive a free one-year subscription to **Model Airplane News.** If already a subscriber, the winner will receive a free one-year extension of his subscription.

ADVERTISER INDEX

HINTS & HELO-ESE

(Continued from page 119)

If you just throw the wrecked heli into your trunk, you'll feel like a garbage man when you get home. If you arrive with a bag containing a *partially assembled* helicopter, you'll be a little more inclined to work on the machine to get it airborne again.

Next month, I'll continue with information on coping with the wind, bolts, heli-orientation terms (the "helo-ese") and a miscellany of good advice that I hope will help keep your rotors turning. ■

HELI CHALLENGE

(Continued from page 105)

tly as you can, and you'll probably still be OK; just try not to get excited or to panic.

4) Longer hops. When you're confident about your forward hops, start making them a little longer and higher until you're actually following the helicopter for a few feet at a time and then landing it. Control its forward speed so that it's moving slowly; don't let it move too fast at first.

5) Practice. Repeat steps 3 and 4, but let the heli drift backward, or to the left or right. Be careful until you get the hang of moving it in these new directions. Remember to start with short hops and work up to longer ones. Work on only one direction until you've mastered it, and then move on to the next direction. Keep this up until you can move the helicopter in any direction you want.

6) Walk your helicopter. Now try to lift your helicopter off and then follow it around the field, always keeping it under control. Don't let it move away too quickly, and if you get into trouble, land and start again. Master this procedure in all directions before moving on to the next step. Make sure that you're still flying your helicopter tail on or from one side; we'll try "nose-on" later!

7) Fly circles around yourself. Stand and fly the machine around you. Try this "tail-on," and then try it from the side. You'll have to move around in a circle to keep up with the helicopter. Don't let the speed "get away from you."

8 Constant-heading figure-8. This maneuver is done "tail-on," and it's a real challenge at first. Lift the helicopter off and let it move away at a 45-degree angle, then bring it around sideways while still moving forward. Then move the helicopter backward so that the flight path is a circle. When the helicopter reaches the starting point, allow it to keep moving backward for a short time; then move it backward and sideways; then forward and sideways until it has flown a second circle behind the first one. When the helicopter returns to the starting point, land it.

9) Horizontal figure-8. In this maneuver, you'll be moving the helicopter through a figure-8 as if you were standing at a point where two circles intersect. One circle is flown to your left, and the other is flown to your right. Be sure that you fly the circles so that the turns are away from you. Try to vary the heli's speed, and vary the size of the circles, too. If you start having trouble, try to think your way out of the problem with the right flight control, and work toward a safe landing so that you can "regroup."

10) Stationary hover! When you can confidently perform all these maneuvers, you'll find it relatively easy to raise your helicopter and hold it stationary. Better yet, you'll be able to move your ship in any direction and stop it anywhere, any time. You now have control of the machine, and you're not afraid to exercise it!

Keep practicing! ■

RACING RENAISSANCE

(Continued from page 113)

When enough pilots in an area have tried this, stage a few heat races—not a contest, but a sort-of fly-in. Listen to participants' comments, and if their opinions are positive, a group of volunteer modelers can meet to draw up a set of rules for the group, and major R/C modeling clubs could organize local events for the new Goodyear class of racers.

Let me know what you think of my suggestions; for now, we'll use the existing Formula 1 aircraft with 4-stroke .40 or .50 engines; no other changes.

I've designed a new version of my favorite pylon racer, the Bonzo, and plans are shown here to spark your interest. It would be competitive in existing Formula 1 racing. If the idea of a slightly larger (than existing Formula 1) airframe is appealing, many designs can be scaled up slightly to give a 600-inch wing area that would conform to my suggested rules. I hope Goodyear racing will attract a much bigger following than the current Formula 1 event.

**Here's the address that's pertinent to this article:*
***NMPRA,** c/o Michael L. Helsel, 20936 Quail Run Dr., Walnut, CA 91789. Tel: (714) 598-3342.* ■